

practically been based on the impulse action of the electric energy between the spark ball electrodes, having installed inside the filter.

When high voltage current impulses applying to the spark ball electrodes, having immersed into the water, the fluid sample is occurred in the interelectrode space, which is accompanied by the significant amount of the energy release, having previously accumulated in the capacitor bank. So, the intensive heating of the plasma produced by the discharge current is resulted in the pressure increase in the discharge channel and its further extension with the strong compression of the adjacent layers of the fluid, in which the shock wave is arisen. So, for all this, the discharge channel is transformed into the rapidly increasing in the size – vapor cavity, which is caused the ripple series following one another compression – low pressure acoustic waves, and the alternating hydro-streams. The decolmatation filter and the sprinkled coating adjacent layers with the electrohydraulic impact is mainly achieved by the acoustic waves and hydro-streams shock force. [2].

The filters decolmatation efficiency by the electrocontact method is depended on the pressure at the shock wave front, the duration of its effect upon the filter, the generated pulses quality.

The various types of the plants are used to be performed electrocontact treatments, but the disk – shaped spark gap base of the negative electrode is particularly distinguished by the highest reliability when it is operated under the various conditions.

Thus, electrocontact method is allowed the parameters control possibility, and it is accessible for the development under the production organizations conditions. [1].

Its main drawback is in the incomplete cleaning of the filter channels from the destroyed colmanant remnants, that is brought the filter plugging point and he filtered zone.

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THE ROCKS FLUID DESTRUCTION APPLICATION IN THE STRIPPINGS PRODUCTION TECHNOLOGY AT OPENCAST MINING OF ORNAMENTAL ROCK DEPOSITS

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The stripping operations are practically produced at the different stages of the development of the mineral resources deposits. The ongoing removal of the alluvium, out-weathered, and the contained host rocks in the temporary or the permanent piles and dumps are laid in the basis of the capital mining and the current stripping operations. So, this process is preceded by the preparatory works, having consisted in their previous loosening, which is practically produced by the mechanical, blast – hole drilling, hydraulic, physical or chemical methods. The extraction, excavation and the loading of the loosed overburden rocks are practically fulfilled by the excavators, earth – moving or loading and transporting cargo machines and vehicles, and the haulage – by the different types of the technological careers strength and pit – run transport.

The natural quality preserving of the mineral resource in the extraction mining process is one of the main challenges in the open pits and the quarries of the ornamental rock. It may be significantly altered, depending on the rocks destruction method, having used at the stripping operations production. So, the explosion is practically used on a number of the open pits and the quarries of the ornamental rock for the preliminary preparation of the stripping and overburden mining rocks. So, the multi-directional network of the cracks and fractures in the marble and marbled limestone, having resulted from the explosion, can be extended up to 50 – 60 m, and in the granites – up to 100 m from the place of its execution. One of the ways to be reduced the artificial fracturing of the ornamental rock is the production development of the stripping operations technology, having provided the layer cutting of the alluvial, and out-weathered mining rocks from the indigenous useful mineral resource the cracks, having filled the viscous fluid. So, across the whole area of this layer, at the day surface layer, by the stripping mining rocks are impacted by the hammers, having mounted on the chassis of the crawler excavators, or of the incident of the large mass of the goods, having held in the place using the ropes by the same technical means. So, this is practically achieved the required quality of the pre – crushing, and the necessary prerequisites are being created for their subsequent cleaning with the smooth mining area, by the excavation and transporting equipment. The comparative studies of the efficiency of the

crushing layer of the alluvial and out-weathered mining rocks, for the case of the absence of its sweeps, as well as for its sweeps of the hydraulic destruction of the mining rocks and the fracture, having formed, using the viscous fluid are presented in the paper.

At the experiments execution, the «Sibit» – the cellular aerated concrete has been used, as the stone material, having characterized by the high level porosity, and low level density and strength. So, the twelve prismatic models with measures $100 \times 125 \times 200$ mm have been made from it. The metal load of 100 mm diameter, 200 mm height, with the central through the vertical inner bore diameter of 20 mm and the weight of 11,9 kg has been used, as the means of the impact fracture models. It could freely be moved by the metal rod with the diameter of 15 mm, and the length of 2,000 mm, and the weight of 2,8 kg. This rod has been mounted on the metal fence in diameter and 100 mm height, with the internal dead-end hole of diameter and 20 mm in height, and also weighing 6,2 kg. So, the requited impact energy load of the model has been achieved, by changing the length of its slip by the metal guide rod. The shock destruction of the three types of the models has been considered in this paper. In all of them, the horizontal exterior incisions have been passed along the perimeter at the distance of 50 mm from the top. To this depth, it has been resettled by five vertical cuts, which are mimic natural fracturing of the mining rocks massif, which is scheduled to the impact fracture. The first of them have not been violated, the second at the distance of 80 mm from the top hook in the crack, having formed, using the fluid, the third at the same distance from the top – the crack, having formed by the viscous fluid. The surface cracks in the models, having simulated the pre – slicing of the mining rocks massif by the fracture, having formed liquid, were moistened with the water, and the viscous fluid – sealant layer thickness of 5 mm.

For the hacked crack formation can beset to be used the special discharge equipment. So, the operations are began from the fact, that on the day surface the barrel is mounted with the viscous fluid, having pasty consistency, which is practically pumped through the pipeline by the handle pump at the initial pressure of 350–400 bar (e.g. 35 – 40 MPa) into the special prepared holes. The estuaries parts of these holes are sealed by the packer devices. In the case of the big length of the holes, in the bottom the casings are driven into them. With the lack of the pressure, the pimp pressure – improvers are practically used in the system additionally to the main pump. As a result of it, the separate hacked cracks are formed in the convergence in general, and the subjected to be deleted the layer of the alluvium and out-weathered mining rocks is cut of the indigenous useful fossil.

It can be practically used the crawler excavators, which are capable of holding the large mass loads, for the preliminary loosening layer of the alluvium and the out-weathered mining rocks. After the hacked crack formation, at the day surface the falling loads blows are produced, which are held on the arrows of the tracked excavators, using ropes. As a result of this, the loosening of the alluvial and out-weathered mining rocks is made, having facilitated its further cleaning.

So, the scraping and the subsequent haulage of the preliminarily loosened layer of the alluvial and out-weathered mining rocks can be made, by the earth-transporting, loading and transporting cars, and dump trucks. On the preliminary crushing layer of the alluvial and out-weathered mining rocks the excavators are embarked, having transported it to the reception trench. The crawler excavators, having equipped by the direct mechanical shovels, are conducted the mining mass loading into the dump trucks, with the purpose of its further transportation and storage in the dumps.

According to the results of the previously conducted scientific researches and studies, for the formation of 1 m^2 cracks in the rocks of the medium strength (e.g. marble, marbled limestone), it is quite necessary not to be exceeded $100 - 126 \text{ cm}^3$ viscous fluid, having consisted of the «Litola 24» mixture and the graphite powder – like in the equal proportions. The price of 100 cm^3 the «Litola 24» mixture and the graphite powder in 1:1 ratio is made up 8,15 roubles (e.g. Novosibirsk Region, 2013). From this it is followed, that the viscous fluid cost, required for the hacked crack area formation $100 \times 100 \text{ m}$ will be made up no more, than 81,5 – 102,7 thousand roubles.

On the basis of the experimental researches and studies, the following scientific and practical conclusions have been obtained on the work done:

1. The reciprocates motions of the interburden layer from the viscous fluid, having caused by the incurring – strikes on the layer of alluvial and out-weathered mining rocks from the day surface, will be promoted the direction transformation of the destructive energy application. The main part of this destructive energy will be gone back in direction of this layer, as it is possessed quite less, in comparison with the indigenous minerals resource weight (e.g. the Law of Inertia Newton);

2. The increasing degree of the pre – crushing layer of the alluvial and out-weathered mining rocks at the stripping operations execution will be helped to be facilitated their cleaning from the mining lease area by using the earth – conveying and transporting equipment, and also further to be reduced the whole amount of the processing at the production the secondary products from them, in the form of the building crushed stone;

3. The interburden layer formation from the viscous fluid will be promoted to greater specific

power reduction of the artificial fracturing of the indigenous layers of the ornamental rock, in comparison with the absence of such activities and events, or the crossovers of the alluvial and out-weathered mining rocks of the hydraulic fracturing crack;

4. The blasting replacing of the alluvial and the out-weathered mining rocks by the interburden arrangement from the viscous fluid, having intercepted them from the indigenous useful mineral resource, will be promoted to be reduced the harmfulness of the stripping operation production, their safety improving, and also the cost – cutting companies and enterprises on the labor health and safety, as well as the environment protection;

5. The energy of the falling weight load is lost in the minimum degree, when shock fracture of the models previously pristine;

6. When the shock fracture models, having previously disturbed by the crack hydro-fracturing, the energy of the falling weight load is lost, in the collisions of their upper and lower parts, as well as their upper parts rebounding from the bottom ones, as less massive from more massive ones. As a result of the double energy loss of the falling weight load, the total number of the debris and their fragments at the shock fracture models, having previously disturbed by the crack hydro-fracturing is less, than at the previously pristine models. Due to the collisions of the upper and lower parts of the models, as well as the upper parts of the rebounds from the bottom ones, there is the energy redistribution of the falling weight load up, and as the consequence, the degree increase fragmentation of the upper parts, compared with the pre – intact models;

7. When the shock fracture models, having previously disturbed by the crack, which has already been formed, using the viscous fluid, the energy of the falling weight load is lost at the collisions of their upper and lower parts, the upper parts bounces from the lower ones, as less massive to more massive, and also it is distinguished in the layer of the viscous fluid. Due to the energy losses triple drop weight load, when the total number of the debris and fragments at the shock fracture models, previously broken crack, having formed, using the viscous fluid is less, than at that, which has been formed by means of the liquid. Due to the degree decrease of the upper and the lower parts collision, the degree reducing of the bounces of the upper parts from the bottom ones, as well as the disappearance of the energy part in the layer of the viscous fluid, there is the energy redistribution of the falling weight load up, but with the decrease in the degree of the fragmentation of the upper parts of these models, in comparison with those, that are pre-broken by the crack, having formed with the liquid;

8. The fluid-fracturing application in the technology of the stocks opening of the ornamental rock will be allowed to be reduced of the artificial fracturing of its indigenous reserves, due to the energy redistribution in the direction of the impact fracture,

which is subjected to be removed the layer of the alluvial and out-weathered mining rocks. For all this, the degree of its pre-crushing will be increased, that will be created the quite good conditions for the subsequent production the secondary production from it, in the form of the building crushed stone.

Thus, the scientific significance of these studies is to be applied the fundamental laws of the mining rocks failure in the solving of the urgent challenges of the mining production and industry. The scientific obtained results, in this direction, can be presented, in the form of the necessary recommendations for the production of the mining activities at the enterprises for the marble extraction, in the form of the special blocks in the open method and way.

Thus, some challenges are remained, the significance of which are quite substantially, which can be solved using the mining rocks fluid – fracturing:

1. The justification of the need for the prior hardening of the fractured massif of the ornamental rock by the polyester resins (e.g. they are used to be filled the cracks) from the holes, that later they will be used for the monolith separation. So, this separation can be performed by the dynamic or the static wedges, as well as using the fluid – fracturing or without it;

2. The justification of the destruction need of the strongly fractured (e.g. «springy») of the oversized ornamental rock through the drilled holes in them blind, having filled by the viscous fluid. So, this destruction can be done by the blow of the hydro – pneumatic hammer peak, and the destructible oversized one itself – can be clamped by piling on it other oversizes.

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DISTRIBUTION OF RESOURCES IN HIERARCHICAL MULTIELEMENT SYSTEMS WITH PARALLEL STRUCTURE

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The Majority of modern chemical manufactures are complicated technological complexes, each stage of processing of raw material on which is carried out by the several same technological operations forming systems with parallel structure. Here there is a problem of modeling and optimization of systems with parallel structure. This problem includes three basic aspects: the decision of distribution problems of the limited resources between parallel operations or elements on top level of management's system, a finding of local-optimum