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Research Article

IMPROVING OF THE EFFICIENCY OF CLEANING OF THE BOTTOM OF THE BOREHOLE FROM THE CRUSHED SLURRY ON THE BASIS OF IMPROVING OF THE CONSTRUCTION OF A THREE-BALLCHISEL

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ABSTRACT

In terms of the problems of effective use of reserves in the technological processes of drilling, it is important to wash the drilling scaffold, that is, to effectively clean it from the crushed slurry. Cleaning the drilled borehole bottom combines three processes that differ from each other: cleaning the bottom surface from the crushed slurry, cleaning the bottom wall environment and cleaning the ore-cleavage device from the adhesion of the slime is important.

In this article, the construction of the ore-shredding device has been improved in order to effectively clean the drilled scaffold from the cuttings and eliminate the negative consequences of the slurry regime. The results of the experiment-test showed that the mechanical speed of the drilling of the scaffold and the increase in the performance resource of the drilling Hopper were achieved.

KEYWORDS

Borehole, cuttings, three-ball chisel, mechanical speed of drilling, chisel resource, number of turns, axle pressure force, amount of fluid.

INTRODUCTION

One of the difficult issues in the drilling process is that it is a slurry regime and its effect on the absorption of the ore-disintegrating instrument, it is considered as complex to create a physical model of the interaction of the rock and ore-disintegrating instrument in the slurry mode. The process of decay begins with the fact that the Rock is scraped through the tooth and the ore divides into several pieces, which are directed in the opposite direction in relation to the movement of the shredding tool. The next action of the crushed slurry is continued by its fragmentation into small pieces and the ore moves to the side relative to the disintegrating device.

Fragmented ore spread evenly across the arc from the bottom of the shredding tool increases the efficiency of scavenging the scavenging. Such a spread of the cuticle will eliminate its repeated decay.

In order to ensure the optimal movement of the separated slurry in the well and to develop a structure of the ore destructor, which allows to effectively cleaning the slurry from the back, it is desirable to consider the scheme of the movement of the separated slurry particles from the borehole bottom. The scheme of the action of the cuttings separated from the bottom is presented in Figure 1.

MATERIALS AND METHODS

The cuttings are cut out by moving with a votesness under the angle of φ. M (x,u) is the product of the cutoff current in the forty plane of the transverse current, which is equal to the density of the current in the perpendicular axis:

$$\rho = lim\frac{\Delta m}{\Delta v} \cong \frac{dm}{dv}; \quad (1)$$

In the action of the slurry stream, the DM element is influenced by the flow mass by the DM dv/dteneration force and the area of gravity of the gdm.

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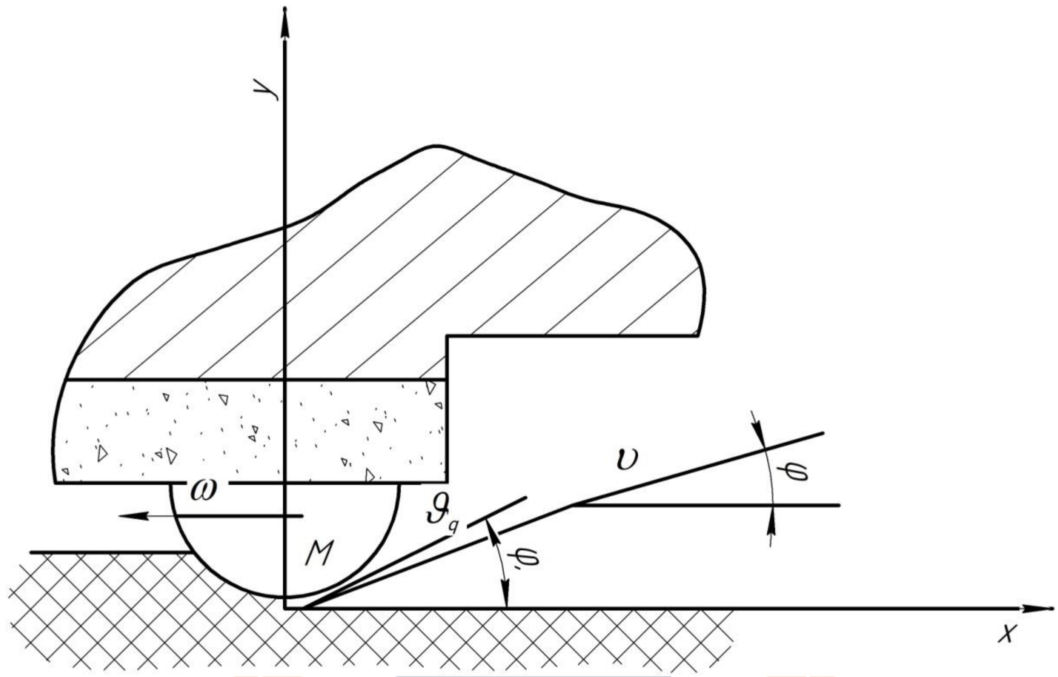

1-figure. Scheme of the pattern of the cuttings separated from the borehole bottom.

The speed of the movement of the stream of the cuticle particles is determined by the same as at the desired point of its training

$$v_0 \cos\varphi_0 = v\cos\varphi \quad (2)$$

from this,

$$v = \frac{v_0 \cos\varphi_0}{\cos\varphi} \quad (3)$$

The law of the formation of the stream of slime flows is found, proceeding from the initial conditions

$$\frac{dx}{d\varphi} = \frac{dx}{dt}\frac{dt}{d\varphi} = v\cos\varphi\frac{dt}{d\varphi};$$

$$\frac{dy}{d\varphi} = \frac{dy}{dt}\frac{dt}{d\varphi} = v\sin\varphi\frac{dt}{d\varphi}; \quad (4)$$

The expression of the maximum purification of the slime from bottom after several changes occurs when the current is not the resistance of the Matrix and the environment is treated as follows

$$x = \frac{v_0^2 \cos\varphi_0}{g\cos\varphi}\sin(\varphi_0 - \varphi)\,; \quad (5)$$

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The same fact is undoubtedly calculated, the efficiency of cleaning the bottom depends on the size of the maximum distance of the shlam along the HoC, the initial speed of the movement of the particle v_0=ω 〖cos φ〗 _0, and after the changes it will be equal to

$$v_0 = \frac{\pi D n}{60} \cos \varphi_0; \qquad (6)$$

Also, the cleaning conditions of the bottom slurry are improved by direct heat to the washing channel of the ore disintegrating instrument of the stream of slurry particles,in which the maximum cleaning of the slurry from φ_0=45 drops is achieved when the slurry is falling.

If (5) the expression (6) is processed in relation to N by putting the expression, then this is equivalent to the number of rotations of the ore shredding instrument corresponding to the above requirements

$$n_p = \frac{10}{\pi D} \sqrt{\frac{xg \cos \varphi}{\sin(45-\varphi)}}; \qquad (7)$$

With the help of the above (7) expression, it is possible to select the number of rational rotations of a ore-shredder, which allows maximum movement along the x axis, directly corresponding to the channel that washes the shred stream formed in the borehole bottom.However, in order to change the indicators of the drilling mode, increasing the number of rotations leads to the fact that the re-wrapping of the cuttings separated from the floor into the tooth or matrix of the tooth of the disintegrating instrument, without corresponding to the washing channel, a certain period of time is maintained between the sex disintegrating instrument and this leads to the absorption of the Matrix and teeth of the ore-shredding device, repeated decay of the cuttings, an increase in energy consumption and a decrease in the mechanical speed of drilling.

Thus, the development of technical solutions that allow to effectively clean the drilling rig from the sludge particles and eliminate the negative consequences of the sludge regime, increasing the efficiency of the exploitation of drilling equipment is of great importance.

THE MAIN PART

When drilling geotechnological, technological and geological prospecting squads with full bottom, three spherical chisels are widely used, in most cases the working resource of these chiselsis marked has a relatively low index.

In order to effectively clean the drilling of the sawdust from the cuttings and eliminate the negative consequences of the slag regime, the construction of the ore-shredding instrument was improved. There, the paw part of the three-pointed chisels is twisted along the screw line, and the cuttings are fixed, during the movement of the chisels, these cuttings form a rolling lifting force of the liquid, and also the maximum direction from the bottom part of the chisel to the side of the walls of the borehole, eliminating the repeated disintegration of the.

The bevel bending angle of the paw part of the revenge ball bearing along the screw line was determined by the following expression [7; 140-141-b]:

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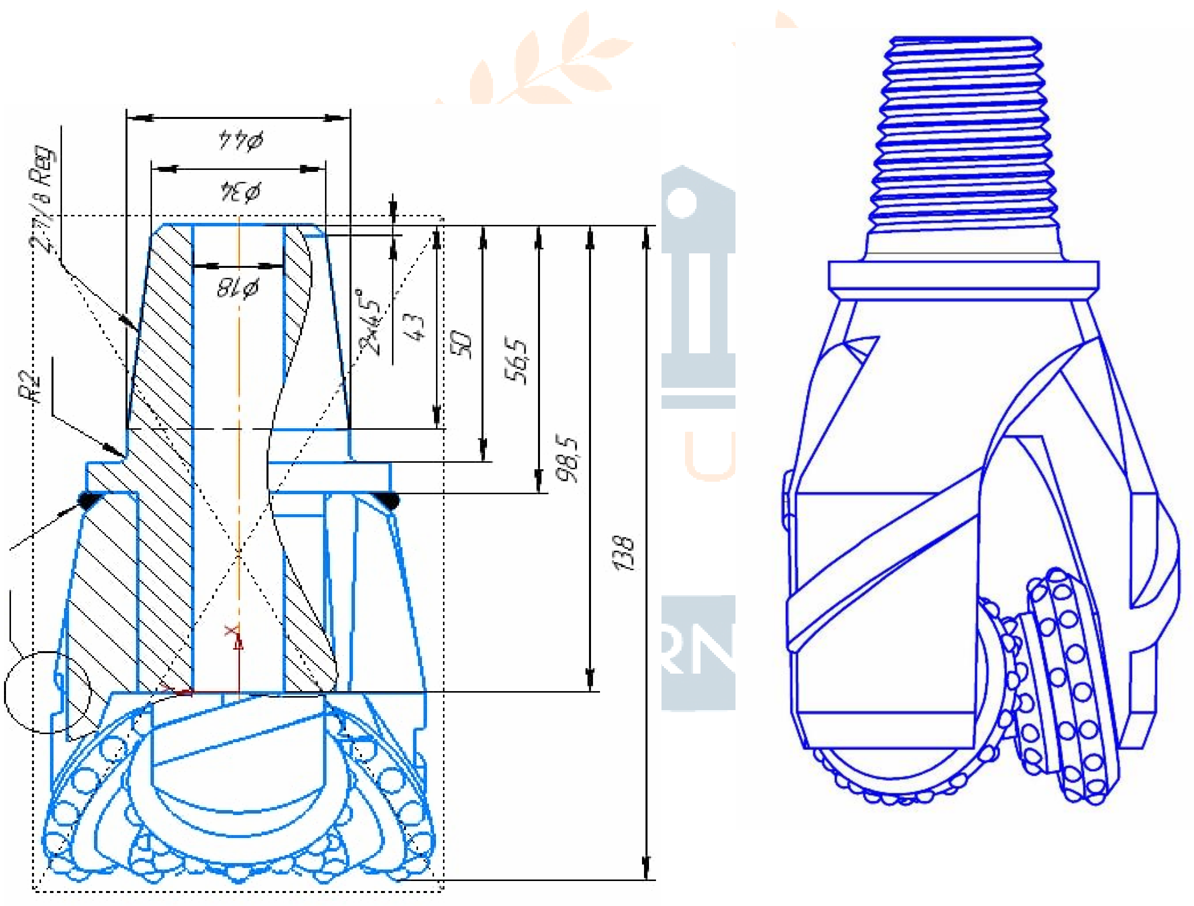
$\beta = arctg\frac{x}{2\pi d};$ (8)

here, the path of the X-screw line, D–the average diameter of the chisel.

$x = \frac{Q}{0.1\cdot\frac{\pi}{4}\cdot d\cdot n};$ (9)

here, Q–the consumption of washing liquid, l/s; n-the number of turns of the chisel, min-1. As a result of the calculations, the size of β=50-55° was obtained.

The drawing of the three– pointed chisel with an improved diameter of 76 mm is presented in 2-pictures of the foundations.



2-figure.Drawing of an improved three-reel chisel.

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The spherical chisel was bent to 50 mm by the paw clamp, while the radial girder was 4 mm thick, the radial girder was fixed to 40 mm thick, the radial girder was 2 mm thick.

The appearance of the actual and post-improvement cases of the three-sphere chisel is given in Figure 3a,b.

a b

3-figure.Base (a) and improved (o) three spherical chisel (76 mm).

In terms of the improvement of the structure of the paw part of the three-pointed chisel, the volume of the gap between the outgoing paws increased, which is the liquid that washes the paw to the evase of the change in The Shape of the paw, which is the 3-th figure.

Also developed are the cases of the paw section of the three-pointed chisel and the awning shovels bent under different angles along the screw line (4-figure).

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a b

a - (β= 60°); b - (β= 65°)

4-figure. The fact that the paw section of the three-pointed chisels and the awning shovels are bent under different angles along the screw line.

In the geological-exploration and exploration drilling works, for obtaining geological data qualitatively, a kern-shaped sample is drilled from the borehole. Even in the case of colonial drilling, the regime of slurry has a negative effect on the durability of the crowns and the mechanical speed of drilling. In order to increase the efficiency of drilling crowns based on eliminating the formation of a slurry regime, a change was also made to their construction.

In terms of improving the construction of the drilling crowns, the bevel angle of the blades along the screw line, eliminating the slurry mode, was selected by the expression above (8).

EXPERIMENTAL RESULTS

In order to reduce and eliminate the formation of the squamous tubular regime, industrial experimental-testing was carried out to determine the effectiveness of improved ore-shredding tools in its construction.

The purpose of the field experiment-testing work was to determine the strength of the ore disintegrating devices and their impact on the mechanical speed of drilling, as well as to determine the rational working regimes that provide high operational performance of the improved dolotes.

Experimental and testing works were carried out at the Central geological exploration party of the geological exploration expedition of the state enterprise Navoi mining and metallurgical combinat, as well as at the Central-Uzbekistan party of the Regionalgeology party.

The experimental-testing work carried out in field conditions was carried out in the following order,

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simple and improved three-lane dolotes were exploited in one type of geological conditions, in different modes of drilling until the complete failure of the dolota. Experimental drilling was carried out in the case when using drilling fluid in rocks whose hardness was equal to F=7÷8 categories, prepared on the basis of technical water and clay (PPB branded clay poroshogi (8%), calcium soda (0,5%), technical water (91,5%)). Experiment-tests for each drilling mode were repeated 3 times.

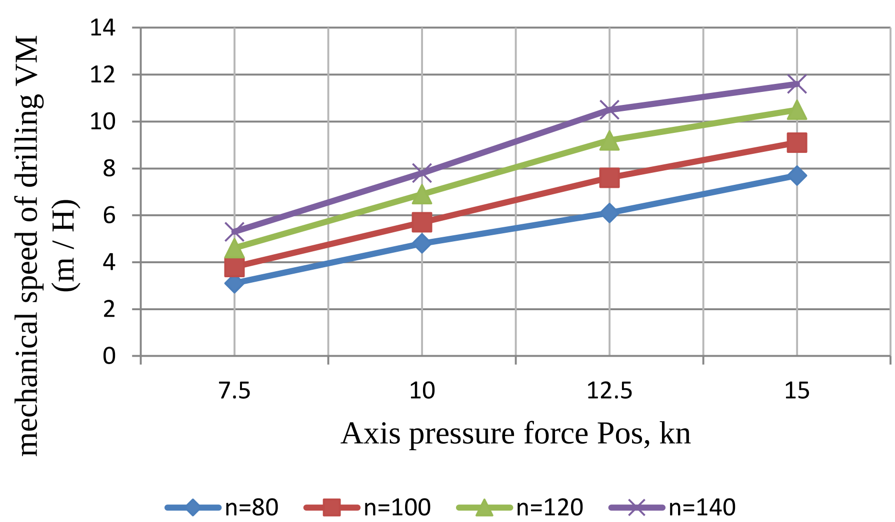
Experiment-the test works were performed on the dimensions of the axial pressure force (Ros) 7,5 kN, 10 kN, 12,5 kN and 15 kN, and the number of turns (n) of the same chisel for each axial pressure force size 80, 100, 120 and 140 min-1.

Completed experience-the cumulative average results of the test work are in the applications.It is presented in table 4.1.

The results of the conducted experiment-test work made it possible to determine the ability of the three-reel chisel to borehole, as well as the mechanical speed of drilling to the indicators of the drilling mode and the constructive structure of the chisel, that is, the connection of the paw part and shovels of the three-reel chisel to the angle of

In the experiment-during the work, it was observed that the resistance of the auger part of the auger and the pliers with a simple curve of the pliers, which was improved, increased by an average of 3% to the auger of the auger.

Experiment on the paw sleeve of the three-pointed chisel showed a good result during the course of the radial part of the paw, where 50 was bent over the radial part, while 40 was mounted under the cornice of the cornice test. Below is a graph of the compressive strength of a simple chisel of 8-th and 9-th and the degree of perfection of the torsion mechanical speed to the axis and the dependence of the pressure on the number of revolutions.



8-figure. Graph of the dependence of the normal chisel on the drilling mechanical speed by the force of pressure on the axis and the number of rotations.

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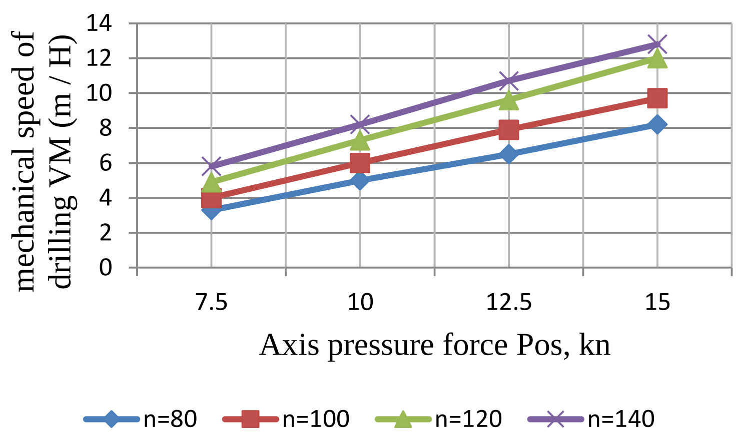
Experience with simple chisel-when carrying out the test work, the Okai pressure force 7,5 kN, the mechanical speed of drilling (Vm) was 80 m/H when the number of turns of the chisel was 3,1 min-1. There was an increase in the mechanical speed of drilling with an increase in the strength of the axis pressure and the number of rotations, the maximum force of the axis pressure was 15 kN, the mechanical speed of the drilling (Vm) reached 140 m/h when the number of rotations was 11,6 min-1 (Figure 8).



9-figure.Improved chisel's graph of the force of pressure reading the mechanical speed of the torsion and the dependence of the rotations on the number of turns.

When applying the improved construction of the three-ball bearing chisel, the mechanical speed of drilling (Vm) was 80 m/H, when the axis pressure force was 7,5 kN, the number of turns of the chisel was 3,3 min-1. The mechanical speed (Vm) of drilling was 12,8 m/H, while the axis pressure force was provided by 15 kN and the number of rotations was 140 min-1 magnitude.In this, it was observed that the use of an improved chisel increases the mechanical speed of drilling by an average of 6% (Figure 9). In the remaining indicators of the drilling mode, there was also such an increase in the area of the mechanical speed of drilling (Vm).

Experience-during the test work, the dependence of the resistance of simple and improved three-reel chisels on drilling modes was investigated. Below are the graphs of the resistance of simple and improved chisels in the figure 10 - and 11 -, the dependence of the axis on the force of pressure and the number of turns.

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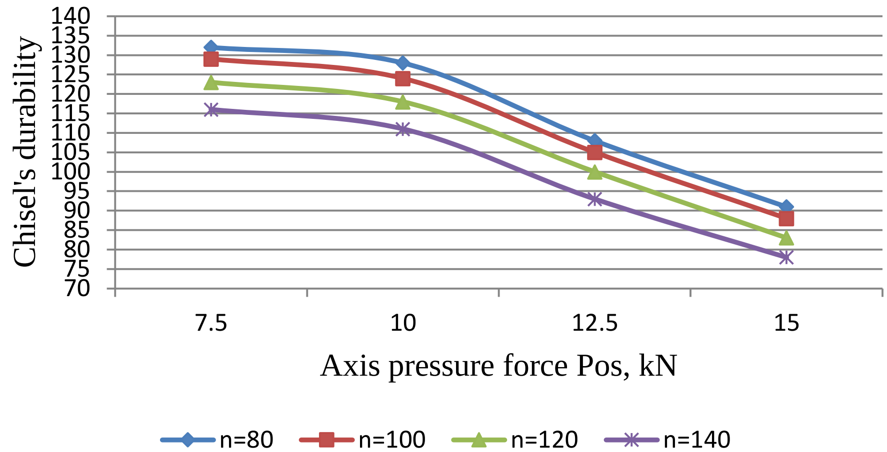
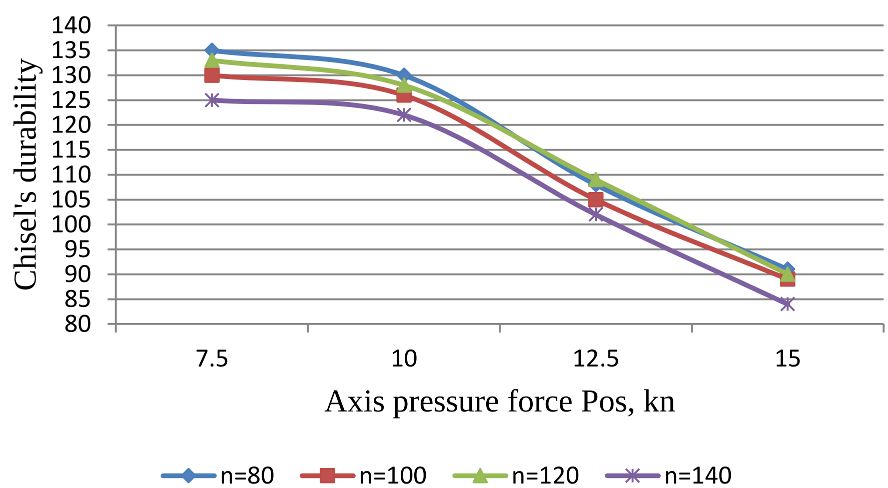


10-figure.Graph of the resistance of a simple chisel to the axis pressure force and the dependence of the number of turns.

In the continuation of drilling of the squadron with a simple dolota, the following sizes of the maintenance mode Ros=7,5 kN, n=80 min-1, G=6,8 l/SEC, the resistance of the chisel (passing resource) was 132 meters. When the number of turns increased every 20 min-1, the endurance of the chisel decreased by 3-4 meters. The resistance of chisel was 128 meters when the reading pressure increased to 12,5 kN and 15 kN when the reading pressure increased to 108 and 91 meters (figure 10). Increase in the number of rotations of the chisel in such sizes as the area of the axis pressure force led to a decrease in the resistance of the chisel. As a result of the increase in the indicators of the drilling regime, there was a decrease in the resistance of the chisel (transition resource).



11-figure. Improved chisel's pressure strength and dependence on the number of revolutions chart.

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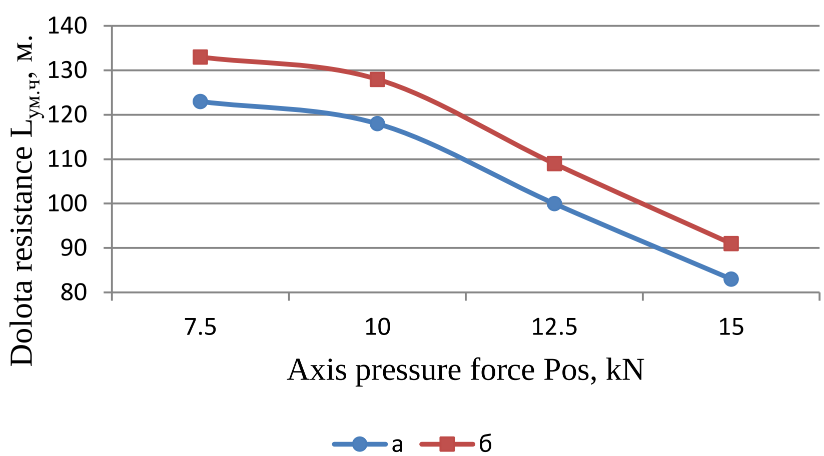
And when using the improved chisel (Figure 11), the resistance of the drilling regime to the sizes Ros=7,5 kN, n=80 min-1,G=6,8 l/SEC was 135 meters, when increasing the number of rotations to 100min-1, 130 meters. The improved chisel almost did not increase durability when compared to the use of an ordinary chisel in the 80 and 100min-1 units of the number of rotations of the chisel. It was found that when the number of turns of the chisel reached 120 and 140 min-1, the endurance increased on average to 8-10 meters. Proceeding from this, it can be concluded that the efficiency of the improved chisel is achieved when the number of turns of the chisel exceeds 120 min-1.

CONCLUSION

The durability of simple and improved chisels is explained by the comparative graphs of the number of turns (n) of the chisel in the sizes of 120 and 140 min-1 in the figure 4.12 - and 4.13.



a-simple chisel; b-improved chisel

12-figure. Simple and improved chisel resistance when the number of turns (n = 120)depends on the pressure strength of the axis and the number of turns graph.

The number of rotations in the size of 7,5 kN of the axis pressure force to be given to the chisel was 120 min-1, when the volume (figure 12), the resistance of the ordinary chisel was 116 meters, and the resistance of the improved chisel was 125 meters. As a result of the increase in the strength of the axis pressure, the durability of both chisels decreased, but the improved chisel resistance was maintained above the average of 7-8 %.

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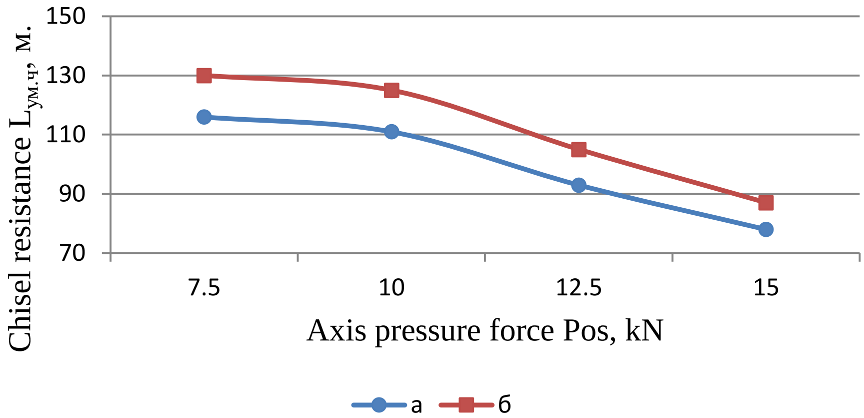

a-simple chisel; b-improved chisel

13-figure. The graph of the resistance of a simple and improved chisel when the number of turns (n = 140)depends on the strength of the arrow pressure and the number of turns.

When the number of turns of the chisel (n) reached 140 thousand-1 (Figure 13), the resistance of the ordinary chisel to the size of the axis pressure force (Pos) 7,5 kN was 116 meters, the resistance of the improved chisel was 130 meters, the resistance of the chisel increased to 14 meters. There was such an increase in the area in other indicators of the oxygenated pressure force.

Based on the analysis of the results of the above experimental-test work, it can be noted that the improved three-reel chiselborehole bottom increases the mechanical speed of drilling (Vm) and the resistance of the chisel on the basis of reducing the formation of a slurry regime. Also, as a result of the conducted experiment-tests, it was found that the high efficiency of the proposed chisel is ensured by the number of its turns (n) 120-140 min-1,the pressure strength of the axis is 10-12, 5 kN.

Thus, it was determined that the application of a rigid section of a three-lane chisel with a curvature of 50 degrees under the curvature of a rigid β=40 degrees under the curvature of a rigid section would increase the mechanical speed of the drilling compared to ordinary chisel.

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