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Constructive Scheme Of Plug Plowing Cotton Fields

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Abstract: The article describes the design and operating principle of an improved plow for plowing the soil of cotton fields with cotton stalks. It was concluded that when plowing cotton fields with cotton stems, it is advisable to use a disk working tool and a stem bender. The use of disc working bodies as a skimmer helps prevent clogging of the plow with stems and plant debris. In this case, it is considered rational to design a plow with a bender mounted in front of odd bodies, a spherical disk and plow bodies installed in series.

Keywords: soil, stebli hlopchatnika, plug, stebleotgibatel, spherical disc, body, spherical disc.

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Today, every year in the world, about 900 mln. In the cultivation of cotton and other agricultural crops per hectare, the use of advanced technologies of land cultivation and modern equipment, while maintaining the fertility of the soil, takes the leading place. In the republic, the average area of cotton cultivation is 1 mln. taking into account that it covers an area of about one hectare", special attention is paid to the development of plows that plow cotton fields with high work quality and productivity and energy-resource efficiency [1, 2].

In this direction, it is important to develop the construction scheme of plows that plow cotton fields and to justify the technological work process, to implement targeted scientific research on ensuring resource efficiency in the processes of interaction of working parts with the soil.

In the agricultural production of our republic, comprehensive measures are being implemented to reduce labor and energy consumption, save resources, grow agricultural crops based on advanced technologies, and develop high-performance agricultural machines. In this regard, special attention is being paid to the development of technical means that ensure the high-quality performance of all technological processes by consuming less energy, including plowing fields with stalks. In the Action Strategy for the further development of the Republic of Uzbekistan in 2017-2021, including "... more than doubling the volume of the gross domestic product by 2030, ... optimization of cultivated areas for 2017-2020, land and rational use of water resources, introduction of modern intensive agrotechnologies" [3]. One of the important issues in performing these tasks is to get a high yield from cotton and reduce their cost due to the technical and technological modernization of plows plowing cotton fields.

PROBLEM STATEMENT AND RESEARCH METHOD.

The structure and working process of the improved plow intended for plowing fields with tussocks was taken as an object of research. The study of the technological work process of the improved plug was carried out according to the results of the literature and field tests.

In the research process, the rules of mathematical calculation, laws of theoretical mechanics, methods of statistical analysis and the methods specified in existing normative documents were used.

The main function of the proposed improved plow is to reduce the metal capacity and provide high-quality processing of fields with stalks. Based on the analysis of the mechanics of the processes of using the tiller and preparing the soil for planting, it is advisable to use a disk-shaped working body and a tiller for plowing fields with tillers. Spherical disc design of the augers prevents the plug from becoming clogged with stubble and plant debris as the disc rotates and advances.

Based on the type and arrangement of working parts of the plug, it was determined that: the optimal construction scheme of the plug is a scheme in which the bender, spherical disk and casings are installed in a row in front of the odd casings.

RESEARCH RESULTS AND THEIR DISCUSSION.

Based on the above, the construction scheme of the improved plow designed for high-quality processing of fields with stalks was developed [5]. The scheme of the improved plow for plowing cotton fields is presented in Fig. 1.

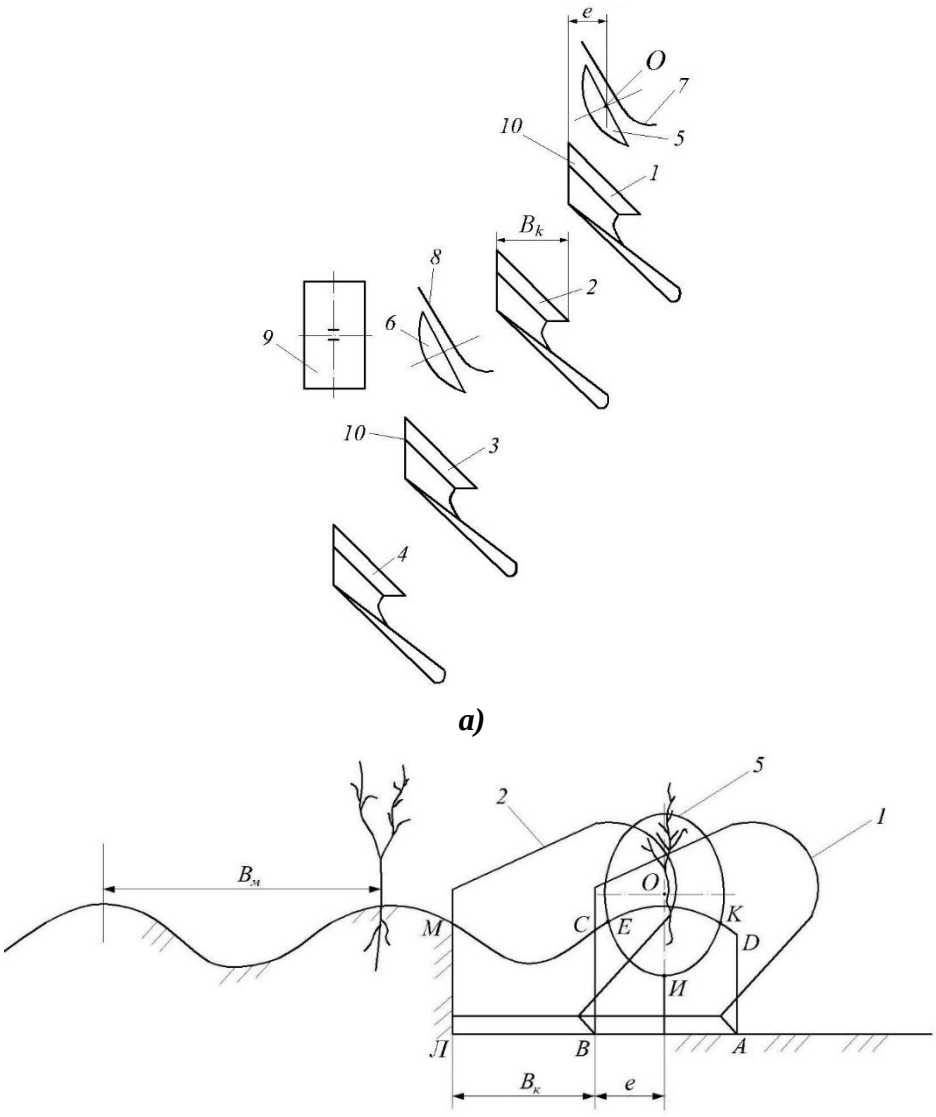
The proposed improved plug consists of even-numbered housings 1, 2, 3, 4, and odd-numbered housings 1 and 3, with stem spacers 7, 8 and flat discs 5 and 6 installed in front. The coverage width of the cases is equal to half of the row spacing, that is, 45 cm. In this case, the lower cutting edge of the gear I is located in the middle of the coverage width of the odd casings 1 and 3, that is, the axis of rotation of the disks in the transverse direction O is equal to the field edge 10 of the odd casings in magnitude *Ye=Vk/2* shifted, where Vk is the width of the casing. The proposed two-tier plow is designed for plowing cotton fields with row spacing *Vm*=90 cm

The plugin works as expected. In the process of work, the plug should be placed between the rows in such a way that the row of stalks coincides with the lower cutting point of the disc-shaped working bodies and in the middle of the blade of the odd bodies. When the plug moves, the bender 7 bends the stalks to the side in the direction of aggregate movement, and the spherical disc 5 cuts the upper part of the bent stalk pusher with the stalk and bends it sideways to the bottom of the stalk. throws, the rest of the hull 1 push ABSD flips over the stalks. As a result, the stalks are buried deep. The hull then cuts the VLMS 2-row span and overturns it.

Based on the conducted scientific research [4], in order to achieve the agrotechnical indicators required for plowing cotton fields, the total coverage width of the plow and the coverage width of its casings should correspond to the width of the row spacing. In order to fulfill this requirement, the coverage width of the cases can be as follows:

$$b_н = b_в = \frac{B_м}{n}, \quad (1)$$

where p- is the number of cases.



1 – picture. Scheme of the improved plow designed for plowing fields with cotton stalks: a - top view; b - rear view

When the number of cases is p=2, 4, 6, vn=vv=45 cm. Since the planned plow is designed for deep plowing of the earth (a=35 cm), we assume the covering width of the casings to be 45 cm.

The coverage width of the plug and the number of cases are accepted depending on the pulling power of the Magnum-8940 tractor:

$$B = \frac{\eta P}{\kappa a}, \qquad (2)$$

here η - the coefficient of utilization of the traction force of the tractor, η = 0,95;

R – tractor pulling power, N;

k – the specific resistance of the two-layer plug, Pa;

a – plowing depth determined based on agrotechnical requirements, m.

Magnum tractor belongs to the 5th class and its nominal pulling force is 60 kN, k = 75 kPa and a = 35 cm

$$B_n = \frac{0{,}95 \cdot 60}{90 \cdot 0{,}35} = 1{,}809\ м. \qquad (3)$$

We assume that the coverage width of a two-tier plow intended for processing cotton fields

with a row spacing of 90 cm is *Vp*=1.8 m.

$$n = \frac{B_n}{b} = 4 \qquad (4)$$

When the number of cases is 4, the unit VII-transmission can work at a speed of V=8.53 km/s. Transverse displacement of the disk-shaped working body relative to the field edge of the odd body

$$ye = V_k / 2 = 22{,}5 \text{ sm.} \qquad (5)$$

Summary. GIt is advisable to use a disc-shaped working body and a stem loosener when plowing fields with stems. The use of spherical discs as a coulter prevents the plug from clogging with stubble and plant debris. The most optimal construction scheme of the plug is a scheme in which the bender is installed in front of the odd housings, the spherical disk and the housings are installed in a row. According to the calculations, since the proposed improved plow is designed for deep plowing of the land, it is appropriate for the casings to cover a width of 45 cm. Use of the proposed improved plow improves the quality of plowing cotton fields, reduces fuel and lubricants, operating costs and increases labor productivity.

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