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DETERMINATION OF THE LONGITUDINAL DISTANCE BETWEEN FURROWS OF MODULAR PLOUGH AGGREGATED WITH HIGH-POWER TRACTORS

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Abstract:
The article presents the results of the research on determining the longitudinal distance between the modular plough furrows that are aggregated with high-power tractors. In addition to two-tier ploughs, modular ploughs for general purposes are widely used in our Republic, but these ploughs are imported from foreign countries, and it has been determined that they do not fully meet the requirements for plowing land in the conditions of our Republic. Based on this, modular ploughs designed for general work have been developed for high-powered wheeled tractors widely used in our country. According to the results of the research, the longitudinal distance between plug furrows intended for general work is less than 88 cm. has been determined.

Keywords. High-power tractor, aggregate, modular plough, furrow, longitudinal distance, research, result, double-layer plough, plough, resource-efficient, technology, structural scheme, plough-turning surface

Introduction

In the world, scientific-research works are being carried out aimed at the development of resource-saving technologies of the main tillage and the technical means that implement them, as well as the effective use of high-power tractors. In this regard, it is considered to be an urgent issue to develop a constructive scheme of a modular plow that performs high-quality plowing of land with low energy consumption, and to conduct targeted scientific research on the justification of the parameters of the working parts that ensure resource efficiency in contact with the soil.

In the agricultural production of our republic, extensive measures are being taken to reduce labor and energy consumption, save resources, grow all crops on the basis of advanced technologies, and develop high-performance agricultural machines.

In our republic, along with double-layer plugs, modular plugs for general purposes are widely

used. But these plows are imported from foreign countries, and they do not fully meet the requirements for plowing land in the conditions of our Republic. In addition, their price is high, which leads to an increase in the cost of cultivated agricultural crops. Therefore, the development of modular plugs designed to perform general work for high-power wheeled tractors, which are widely used in our Republic, is an urgent issue.

Research Methods

Research in the process development of a modular plow construction, theoretical mechanics in the theoretical basis of its parameters, farming mechanics, laws and rules of mathematical statistics are used.

The structural scheme of the modular plug designed for general work is shown in Fig. 1. It consists of a frame 1, a body 2, a suspension device 3, a mechanism for adjusting the width of the first body coverage 4, a screw 5 for changing the direction of the traction line.

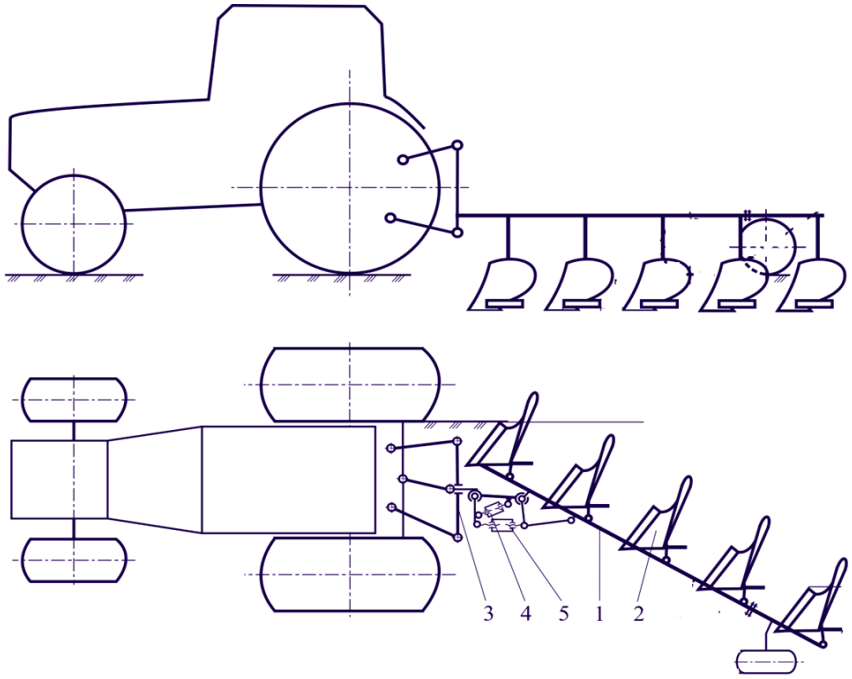

Figure 1. Construction scheme of the modular plug to be aggregated with high-power tractors

Research Results

Determine the longitudinal distance between the plug bodies . We determine the longitudinal distance between the bodies of the plug based on the condition that the processed blade does not change its dimensions during the process of overturning and that it should not reach the structural elements of the body in front during the movement of the plug.

It is known that an unjustified increase in the longitudinal distance between the bodies leads to an increase in the metal capacity of the plug and the torque that overturns the tractor in the transport state of the unit. Therefore, when choosing this distance, you should try to make it as small as possible.

From picture 2: for the first type of decomposition of the soil

$$L_1 \geq l_{пв} + l_{пд} + l_{д1} - l_л \quad (1)$$

and for the second kind of decomposition of the soil

$$L_2 \geq l_{пв} + l_{пд} + l_{д2} - l_л \ , \quad (2)$$

in this case l_{pv} is the forward part of the body's smooth surface
exit;

l_{pd} - the length of the part of the hull field board that protrudes from the transom;

$л_{d1}$, $л_{d2}$ - longitudinal distances from the heel of the plow to the point of exit to the wall with the crack plane, respectively, for the first and second cases;

l_l - the projection of the plow blade on the longitudinal axis.

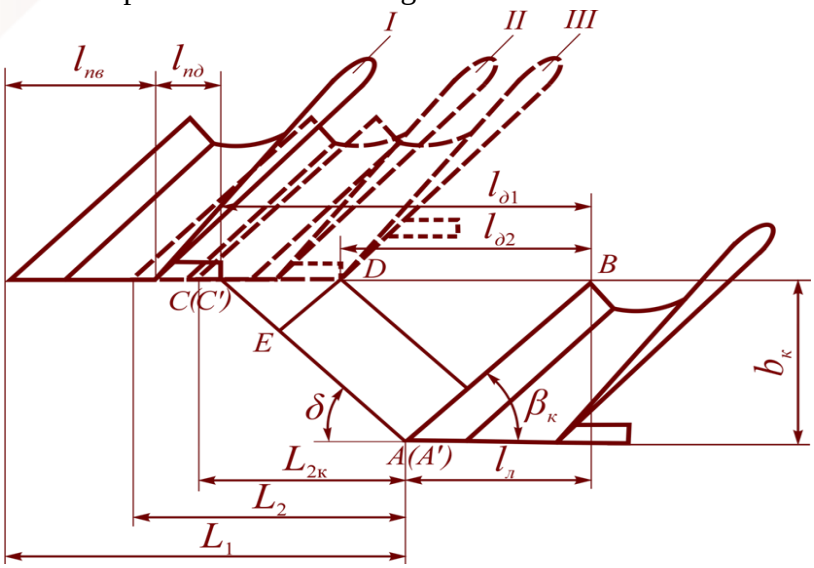

Fig. 2. Longitudinal distance between plow bodies scheme for identification

From Figure 2 we have the following

$$l_{д1} - l_л = b_к ctg\delta \ ; \qquad l_л = b_к ctg\beta_к$$

and

$$l_{д2} = atg\frac{1}{2}(\alpha_к + \varphi_1 + \varphi_2)\sin(\beta_к + \delta)/\sin\beta_к \ . \quad (3)$$

Taking these expressions into account, expressions (1) and (2) appear as follows

$$L_1 \geq l_{пв} + l_{пд} + b_к ctg\delta \quad (4)$$

and

$$L_2 \geq l_{пв} + l_{пд} + b_к ctg\delta + atg\frac{1}{2}(\alpha_к + \varphi_1 + \varphi_2)\sin(\beta_к + \delta)/\sin\beta_к \ . \quad (5)$$

, the increase in the width of the corpus increases the value of *L1 , and in the second case, it*

decreases it.

l_{pv} = 35 cm; l_{pd} = 15 cm; a = 35 cm; b_k =0.40 m; δ=50 °; α_k = 30 °; φ_1 = 30 °; When φ_2 = 40 °and β_k = 40 °, calculations based on expressions (4) and (5) showed that the longitudinal distance between plow bodies for general works should not be less than 88 cm.

Summary

1. In our republic, in addition to double-layer plugs, modular plugs for general purposes are widely used. But these plows were imported from foreign countries, and it was found that they do not fully meet the requirements for plowing land in the conditions of our Republic.
2. It is urgent to develop modular plugs designed to perform general work for high-power wheeled tractors widely used in our republic.
3. In the results of the conducted research, it was determined that the longitudinal distance between plug bodies intended for general works should not be less than 88 cm.

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