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CONSTRUCTION OF THE PROFILE OF THE FURROW AND ITS PARAMETERS: DISTANCE FROM THE FURROW WALL TO THE FULCRUM OF THE WRAPPED BED AND BETWEEN THE BEARING POINTS OF THE BEDS.

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ABSTRACT:*Under the construction of the profile of the furrow is meant the drawing on paper of successive positions of the cross-section of the seam when it is turned by the plow. The constructed furrow profile allows you to calculate the surface area of the arable land, its ridging and the permissible depth of plowing with this plow. The construction is done on the assumption that the soil layer does not deform during the turnover.*

INTRODUCTION

Let - plowing depth, - width of capture of the plow body. When constructing a reservoir turnover scheme, the geometric relationships shown in the figure are used. one. Ribs of layers, etc. will be removed from one another at a distance equal to the width of the formation The edge of the dumped layer, extended until it intersects with the bottom of the furrow, will cut off a line on it, the length of which from the wall of the furrow is equal to the depth of plowing

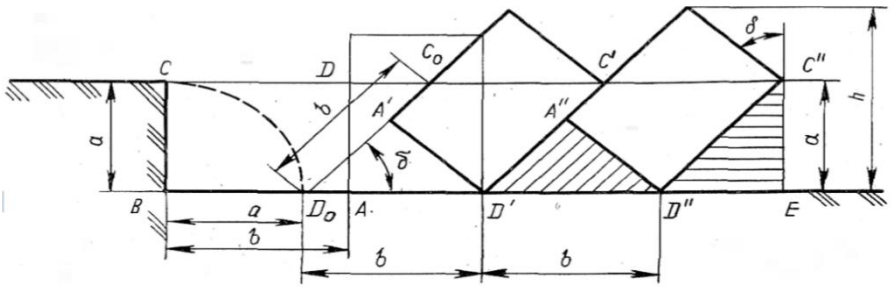

Figure 1 - Scheme of formation turnover

1. Joint points of dumped layers, etc.lie at the level of the unplowed field.

The latter follows from the similarity of triangles and, in which the two sides and angle are equal. With these considerations in mind, the following should be done to build a furrow profile.

1. Put a point on the line of the bottom of the furrow (make a notch at the bottom of the furrow from a point with a radius); 2. From a point, as from the center, make a notch with a radius at the level of the unplowed field. 3. With the same arc, equal, make serifs, and also, etc. on the furrow bottom line and at the level of the uncultivated field, respectively. 4. Restore the perpendiculars from these points to the corresponding faces of the layers, for example, ', etc. The angle of inclination of the dumped layer to the horizon is determined from the ratio It follows from the similarity of right-angled triangles that. Figure 1 shows that the height of the points, etc. from the bottom of the furrow is. Whence the theoretical fluffiness of arable land is determined by the formula The length of the broken line of the surface of arable land, proportional to the increase in surface area, is determined by the formula Obviously, it reaches a maximum at. Taking into account that, we have the relation Consequently, the maximum surface area of arable land will be in the event that the width of the furrow is approximately 1.5 times its depth. At the same time, the weathering of arable land is maximum. To combat it, it is necessary to attach a harrow to the plow or install skimmers. In the latter case, the layer will turn more fully. The angle of inclination of soil layers when the plow is working with skimmers can be determined from the equality where is the depth of the skimmer stroke

2. **Determination of the ratio of the dimensions of the formation, ensuring its stable position.**

In order to prevent the seam from tipping back into the open furrow after the plow body has passed, the center of gravity of the cross-sectional area of the seam must lie to the right of the support point of the seam on the bottom of the furrow.The position of the diagonal, at which the formation can still maintain its position, albeit unstable (Figure 2), will be the limiting one.

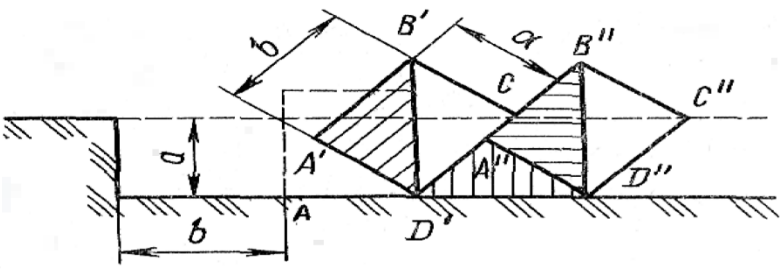

Figure 2 - Determination of the maximum plowing depth From the similarity of right-angled triangles and we have the equalities

$$\frac{B'D'}{D'D''} = \frac{A'B'}{A''D''}$$

$$\frac{\left(\sqrt{a^2 + b^2}\right)}{b} = \frac{b}{a}$$

$$b^4 = a^4 + a^2b^2$$

$$\frac{b^4}{a^4} = \frac{b^2}{a^2 + 1}$$

3. **Having solved the biquadratic equation, we have or.**

When plowing with a skimmer, the angle of inclination of the dumped layer is less than when plowing without a skimmer.Therefore, when working with a skimmer, the attitude.In real conditions, the normal rotation of the seam with a plow without a skimmer is obtained at, and on loose soils at. Screw and semi-screw blades on special plows work well at ratios or more.

4. **Angles characterizing the share - moldboard surface.**

The working surface of the dump can be built by moving a rectilinear generatrix parallel to the bottom of the furrow along a certain guiding curve (Figure 3) located in a plane perpendicular to the share blade. The tangent to the guide curve at its lowest point forms an angle with the horizontal plane, which characterizes the installation of the share to the bottom of the furrow. When the line moves along the guiding curve, generators are obtained,, etc. These lines form angles with respect to the furrow wall, the variation of which with height indicates the type of blade. All dumps with a horizontal generatrix are divided into four types: cylindrical, cultural, semi-screw, high-speed. The values of the angles and are given in Table 1

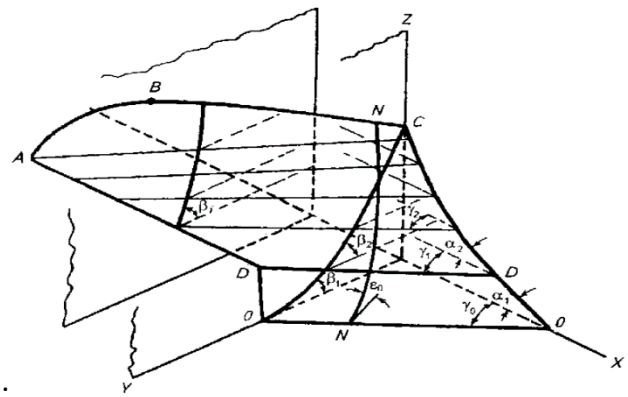

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Figure 3 - Characteristic elements and angles of the plow body: , - generators;- the angle of shear (the angle between the generatrix and the wall of the groove in height);- angle of rise;- formation rotation angle

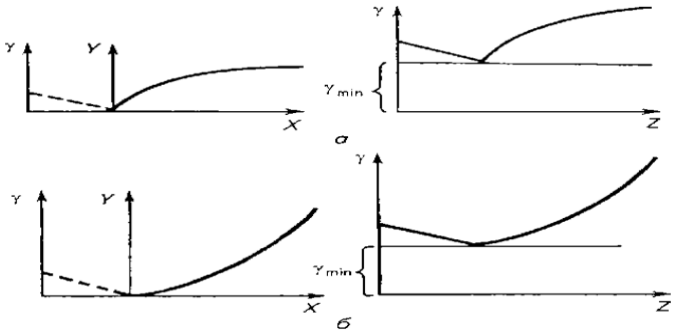

Figure 4 - Regularity of changes in angles in height: a - for a cultural dump;b - for a semi-screw blade Table 1 - Limits of change of angles and, degrees

Blade type	γ_0	ε_0	$\gamma_{max} - \gamma$	$\gamma_0 - \gamma_{mi}$	Height of the plane with the Value, mm
Cylindrical	45…55	30…35	0	0	–
Cultural	40…45	25…30	2…7	1…3	50…100
Semi-screw	35…40	20…25	7…15	2…4	50…100
High-speed	38	27	5…7	1…2	150…200

For the cultural dump, the change in angles from to is determined from the graph (Figure 4, a), built according to the equation of the curve

$$y = \frac{6.2 \cdot x^2}{\left(x^2 + 100\right)}$$

and for a semi-screw blade (Figure 4, b)

$$y = x^2$$

5. where is the current coordinate for determining the angles (it is plotted on the graph in an arbitrary scale), cm; x is the distance in height between the section under consideration and the section with a corner, see.

Initial data for the construction of the dump surface. The share-moldboard surface is obtained by deploying a triangular wedge on a curved surface.Ruled curved surfaces have become widespread, which are formed by moving in space a straight line, called a generatrix, parallel to the horizontal plane along a certain guiding curve.

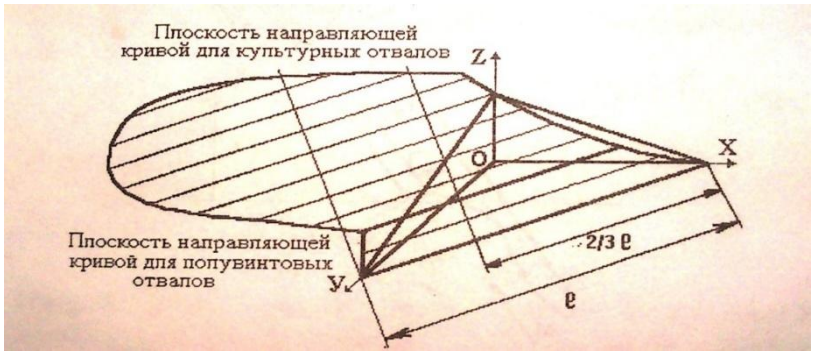

Figure 5 - Location of the plane of the guide curve on the share-moldboard surface To obtain an unambiguous dump surface, it is necessary to know the law of the change in the angle of inclination of the generatrices to the furrow wall, depending on the height of their location above the bottom of the furrow.This law determines the type of dump (cylindrical, cultured, semi-screw).

6. Guiding curve and determination of its parameters.

In the dumps, the guide curve is located in a vertical plane drawn perpendicular to the share blade, through the end of the share - for semi-screw dumps, or through a point two-thirds of the share length from the start of the share - for cultural dumps. The shape and quality indicators of the blade work depend on the type and parameters of the guide curve. As a first approximation, a circular arc is taken as a guiding curve. If you look at the blade in the direction of the arrow, then in the section you can see a curve described by a radius from the center and having an overhang and height. The length of the arc of the guide curve is chosen so that the layer lifted by the dump completely fits on it, and there is no soil spilling over the point

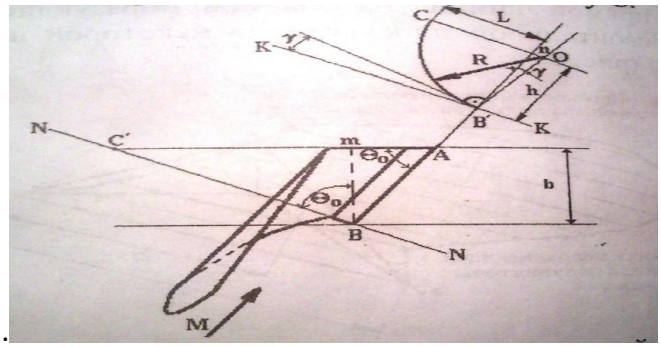

Figure 6 - Parameters of the guide curve

To obtain the parameters of the guide curve, draw a plane through the end of the share blade perpendicular to the blade until it intersects with the line of the furrow wall.A triangle is formed, which is a part of the formation that must be lifted and located on the surface of the dump without shedding.Obviously, for this requirement to be fulfilled, it is necessary to fulfill the condition

$$BC' \le \cup B'C$$

Out of the triangle $BC'm$

$$BC' = \frac{Bm}{\cos\theta_0} = \frac{b}{\cos\theta_0},$$

т.к. $Bm = b$

It follows from the triangle: $< B'nO = \frac{\pi}{2} - \gamma$. Then $B'C = R\left(\frac{\pi}{2} - \gamma\right)$ – arcofacircle,defined through the central angle. Substituting the obtained values of the segment and the arc into the equation, we get:

$$\frac{b}{\cos\theta_0} \le R\left(\frac{\pi}{2} - \gamma\right)$$

Hence the minimum value of the radius

$$R_{\min} = \frac{b}{\left(\frac{\pi}{2} - \gamma\right) \cdot \cos\theta_0}$$

Knowing the radius, you can define other parameters of the guide curve: overhang and height.From figure 6 segment $Cn = l$, $Cn = CO - On = R - On$. It follows from the triangle that $On = R \cdot \sin\gamma$.

Then

$$L = R - R \cdot \sin\gamma = R(1 - \sin\gamma)$$

Similarly from a triangle $OB'n$:

$B'n = h = R \cdot \cos\gamma$;

$h = R \cdot \cos\gamma$

A guiding curve in the shape of a circle has a constant curvature.With such a curve, the fulfillment of agrotechnical requirements for crumbling and seam turnover is impossible.To eliminate this phenomenon, a guiding curve with variable curvature is adopted.As such a curve, a parabola is most often taken, for which the values of the overhang L and the height h are kept the same as for the preliminary guide curve, and it is called the actual guide curve.

7. The law of measuring the angles of inclination of generatrices to the wall of the groove and the order of their construction.

The law of variation of the angles of inclination of the generatrices to the wall of the furrow according to the height of their location above the bottom of the furrow, i.e., determines the technological capabilities of the dump in terms of crumbling and seam turnover.Therefore, the dependence is selected during the design, depending on the name of the blade and are subdivided into cylindrical, cultural, semi-screw and screw.

Figure 7 shows that cylindrical dumps are built according to the simplest law of changing the angles of inclination of the generatrix, when is a straight line, i.e.the angle remains constant.With some plows, an increase in the angle is possible in the upper part. θ_i до $\theta_{\max}$

- distance from the day of the furrow to the position of the generatrix Figure 7 - The law of variation of the angles of inclination of generatrices to the furrow wall for various types of dumps

In cultural dumps, when the generatrix moves up along the z-axis to z1, the value of the angle decreases.This provides the moldboard with better seam reception and reduces scuffing by the cutter.From a height of Z1, the angle of setting the generatrix to the furrow wall sharply increases according to the parabola law, which contributes to intensive crumbling of the soil.The further largest increase in the angle contributes to a satisfactory turnover of the formation.

In semi-screw dumps, the angle increases intensively only in the upper part of the dump, which contributes to a complete turnover of the seam.However, such dumps have a slight crumbling of the soil. The greater the difference between the angles and, the higher the turning ability of the blade.The values of the angles characterizing the type of blade are presented in table 2. Table 2 - Values of the angles characterizing the type of blade

Blade type	θ_0, hail	γ, hail	θ_{max}- θ_0,hail	θ_0- θ_{min}, hail
Cylindrical	45…55	30…35	0…2	-
Cultural	40…45	25…30	2…7	1…2
Semi-screw	35…40	20…25	7…15	2…4
High-speed cultural(>8км/ч)	30…40	23…27	2…7	1…2

For construction, the values of the angles are set:

θ_0 – angle of setting the plowshare blade to the furrow wall, degrees;

- the minimum angle of setting the generatrix to the furrow wall (at the height Z1), degrees; θ_{max} – maximum angle of inclination of the upper generatrix to the furrow wall, deg.

LITERATURE

1. 1. Blednykh V.V. et al. "Tillage and sowing machines", Chelyabinsk, 2004 2. Klenin N.I.and others. "Agricultural machines", Kolos, 2008 3. Kapustin A.N."Fundamentals

of the theory and calculation of machines for basic and surface tillage, seeding machines and machines for fertilizing", Tomsk Polytechnic University, 2012