GEOMETRIC BACKGROUND FORMS NEW AGRICULTURAL DISC OF METHOD OF INTERFACE

M. Svyatina ,T. Voznyk ,V. Yurchuk.

***Summary.* This article deals with methods of designing and manufacturing workers of agricultural machines, namely, spherical disc harrows, which are convex-concave profiles the disc and take on the disc is not more than half its length**.

***Keywords:* working bodies disk type, stamping disks, spherical belt tension and compression, internal ground connections.**

Formulation of the problem. In agricultural machine building Ukraine conducted significant work aimed at solving to increase the productivity, functionality, agricultural machinery, which, moreover, must be reliable and durable, and simple in design work and meet modern agro-technical requirements. Among these works are important theoretical studies agrotechnological processes performed by tillage tools work because of the degree of compliance with the working surface of their appointment depends on the quality of such instruments and their ability to work. Establishing the most efficient forms and surfaces working parameters of finding the optimal technological parameters of their work - the most important task facing researchers.

Analysis of recent research. One of the major drawbacks of modern methods of construction workers tillage machines are some traditional thinking associated with the use of design patterns when designing machines and solutions that have already been used [1]. But apparently no limit to perfection and the need to look for promising new types of guns, chewing thoroughly researched agronomic processes carried them to expand variants of action on the ground, increasing the number of new types of construction, field testing which can provide higher performance efficiency. This will achieve high functionality working bodies, increasing the number of execution options of selecting the best possible sample that can be achieved by careful study of the process of finding the optimal solution surface action of the working body [2].

The wording of Article purposes. There disc tillage device, consisting of tools, each of which has active and passive disks. These disks are installed with the collapse in the horizontal and vertical planes, with the active drive has drive mechanism for rotation. Currently, the surface of new forms of work are mainly experimental selection based on prototypes developed. Existing design methods make it possible to interpret the experimentally selected geometric surface, perform exactly its construction.

It should also be noted that the development of methods for the geometric design of the working surface can be made only with considerable simplifications and assumptions processes of interaction between the soil and the surface of the body. This is due to the heterogeneity of the soil environment and the complexity of accounting wide range of physical and mechanical properties and structure parameters, depth, width, velocity and other agronomic parameters [3].

Main part. At the present stage of applied geometry important task is the development of methods for designing surfaces that satisfy the greatest number of fixed predefined operating conditions and are most effective from the economic point of view.

Before we described a new disk tool was tasked factors increase compression and stretching of the selected disc cavities soil layer by performing channel compression and stretching in two spherical zones that provide extensive destruction of intra-ground connections. These factors largely determine the parameters and efficiency of the entire instrument. Said task is achieved by cultivating in disk geometrically composed of spherical zones, these zones combine to form a radially convex-concave profile of the drive and drive generators to take no more than half its length (Fig. 1). Soil drive (1) is assembled from two spherical zones: the inner zone (2) located near matychyny (3) and the outer belt (4) with a diameter D, located from the side of the rim, connected by a curved surface in the form of a convex surface rotation.

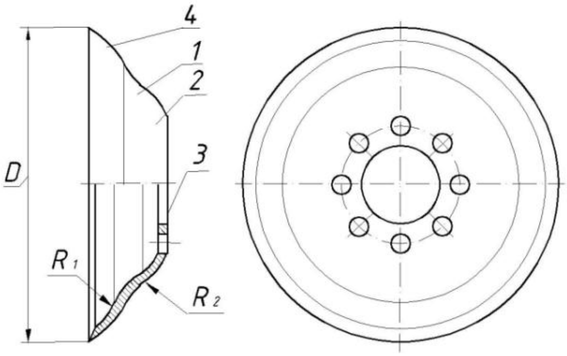

Fig. 1.

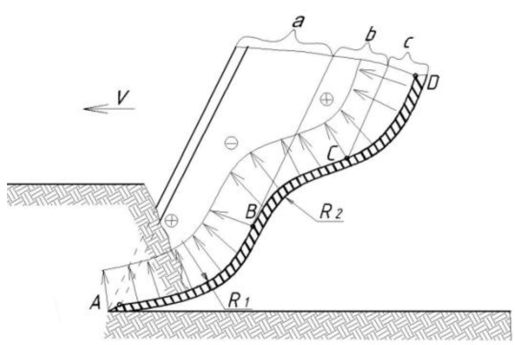

Fig. 2.

Ground Drive convex-concave shape operates as follows. In working position drives deeper along the axis line, operating on its soil spherical peripheral belt (4). This dedicated disk rim topsoil in line between the discs is compressed. Moreover, the soil is constantly shrinking, as the diameter decreases from the periphery to the center of the disc, increasing destruction of internal connections in the soil. Performance is further enhanced compression to the axis of rotation as you move the disk drive channel narrowing of the peripheral zone (4) with a radius R1 to the inner belt zone with a radius R2. This additional performance upgrades liquidation process interdependencies of the soil, which in turn contributes kryshinnyu soil and its subsequent active separation (Fig. 2).

Internally concave spherical zone (2), with a radius R2, is stretching the selected layer of soil. The process of compression and stretching soil is cut in convex-concave area of the disc. The resulting combined process performance compression zone (4) and subsequent stretching in the area (2) will promote kryshinnyu ground in line with the actions disks with radii R1 and R2, moving closer to the axis of rotation. This will facilitate the subsequent transport shomu soil. This process is accelerated by the fact that the axis of rotation of the disk around a zone of backwater action disc hub itself. From the point of view of geometric coupling spherical surfaces associated with the choice of mediators and the nature of their touch. Called conjugated surfaces surfaces that are in relative motion, mutually and constantly touching and at every point of contact with a common tangent plane. Touch surfaces can be conjugated linear and point. The linear contact surface is vzayemnoobvidnymy because each of the two conjugate surfaces paired. The process of loosening its rotation and soil laying Discs studied enough. So complicated is moving in the direction of the soil, limited velocity vector in the plane.

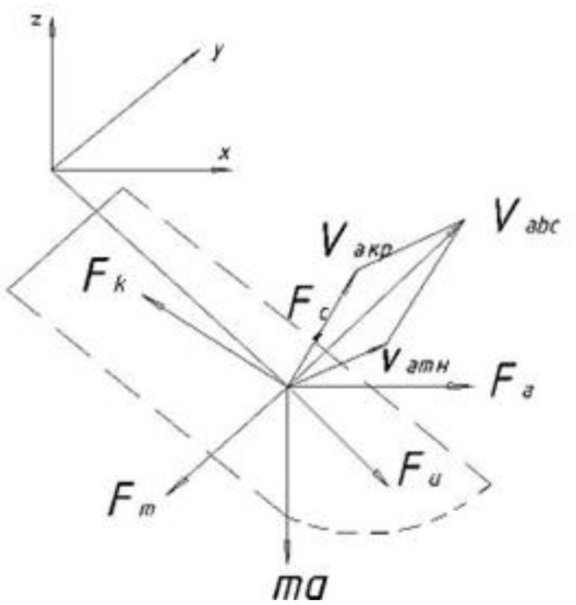

Fig. 3.

In the process of moving loose earth loosening it are equivalent force:

$$\vec{R} = \vec{F_k} + \vec{F_c} + \vec{F_m} + \vec{F_a} + \vec{F_u}, \qquad (1)$$

where F_k - Coriolis force;

$$\vec{F_k} = 2m_0\omega R_1 \frac{d\varphi}{dt}, \qquad (2)$$

there m_0 - particle mass soil;

F_c - the centrifugal force of inertia;

$$\vec{F_c} = m_0\omega^2 R_i, \qquad (3)$$

F_m - friction relative to the disk surface;

$$\vec{F_m} = \vec{N} tg\varphi , \qquad (4)$$

here N - normal pressure power drive;

F_a - axial force of inertia;

$$\vec{F_a} = m_0 a \frac{d^2\varphi}{dt^2}, \qquad (5)$$

here a - Continue moving soil-range drive;

F_u - tangent force of inertia;

$$\overrightarrow{F_u} = m_0 R_i \frac{d^2\varphi}{dt^2} . \quad (6)$$

The solution of equation (1) graphic-analytical method to determine the strength and direction of the module R. [4]

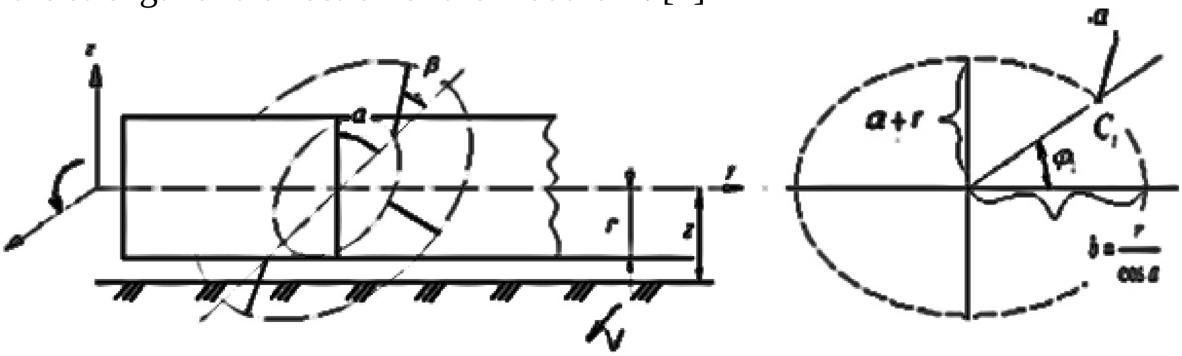

Fig. 4.

Considering one of the drive section (Fig. 4) can determine its width:

$$b = 2Rtg\alpha . \quad (7)$$

The distance between the ends of two adjacent discs;

$$b^1 = \frac{4Rtg\alpha}{z}, \quad (8)$$

where *Z*- Drive element in forest.

Depth cultivation:

$$h = R - z_0 . \quad (9)$$

where z_0 - the distance between the axis of the drum and this ground plane.

Considering the process of cutting soil two adjacent discs rotating in a vertical plane to determine supply drive:

$$S = \frac{2\pi\upsilon}{z\omega} = \frac{2\pi R}{\lambda z} . \quad (10)$$

Conclusions. Using the proposed combined disk special devices for soil will greatly increase the technical and technological tools of disk reliability by improving the compression-stretching process, i.e. as a result of better znakopereminnoyi action on selected soil. This, in general, promotes technical reliability as cultivating the drive and the entire tillage machines.

Literature

1. *Босой Е.С.* Теория, конструкция и расчет сельскохозяйственных машин. / Е.С. Босой, О.В. Верняев, И.И. Смирнов, Е.Г. Султан-Шах. – М: Машиностроение, 1977 – 568 с.

2. *Горячкин В.П.* Земледельческая механика. Собр. соч. в 3-х т. / В.П. Горячкин. – М.: Колос, 1965. – Т.1 – 282 с.
3. *Завгородний А.Ф.* Геометрическое конструирование робочих органов корнеуборочных машин. / А.Ф. Завгородний, В.І. Кравчук, В.П. Юрчук. – К.: Аграрна наука, 2004. – 240 с.
4. *Герук С.М.* Механическая модель рыхления рунта. / С.М. Герук // Конструювання, виробництво та експлуатація сільськогосподарських машин: загальнодержавний міжвідомчий науково-технічний збірник. – Вып.43.– Кировоград, 2013. – С. 276 - 283.