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# JUSTIFICATION OF THE TECHNOLOGICAL SCHEME OF A POTATO DIGGER-SEPARATOR AND A POTATO DIGGER-LOADER

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**Abstract**
*The article provides a methodology for determining the theoretical study of the movement of potato tubers and impurities in a lifting centrifugal-separating bar elevator in potato harvesters.*
**Keywords:** *Potatoes, machine, loader, harvester, conveyor, elevator, beater, drum, tops, separation, soil, centrifugal separator, topper, flange.*



## Introduction

Separation of tubers from the soil and lifting them after digging is carried out in potato harvesters with a bar elevator, which is the main working body of these machines. It is made in the form of a bar conveyor, but is called an elevator, as it lifts tubers. The two main tasks of the bar elevator are soil separation and lifting and transporting tubers without damaging them. In the well-known works of scientists and designers: N.V. Firsova. Petrova G. D. Sorokina A.A. Kolchina N.N., Vereshchagina N.I., and others, both of these problems were solved. It should be noted that more work is devoted to soil separation than to improving tuber rise. Obviously this is true, since soil separation is more complicated than lifting the tubers. The main parameters of the bar elevator: speed of the elevator bed -V, length -L, width -B, pitch between bars - t, diameter of bars -d, lifting coal of the working branch -□, amplitude in the CIS countries potatoes are grown in various soil and climatic zones, moreover, the weather during the period of its cleaning is unstable. The volume of potato production, as indicated earlier, is very significant. The area allotted for this crop in most farms exceeds several hundred hectares. In this regard, the agriculture of the European part of the CIS needs high-performance

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harvesting equipment, mainly combines, which would combine high productivity, adaptability to a variety of harvesting conditions, minimum manual labor costs with a limited range of equipment production. The existing two and three row potato harvesters with an improved working body have the following parameters: shaking amplitude - r, shaking frequency - □, [1 / s] or w [rad / s]. The lift angle of the elevator located behind the plowshares, usually called the main elevator, is taken on the order of 20□. An increase in the angle causes tubers to roll down along the bars of the elevator and damage them, especially in connection with the shaking of the working branch of the elevator bed.

**Literature Survey**

To eliminate rolling of tubers with an increase in the angle, the rods are bent through one, i.e. the bar web is made stepwise. The following basic requirements are imposed on working bodies of this type: high productivity for separating working bodies (up to 150 kg / cm2), high completeness of soil separation (70-80%), minimal losses and damage to tubers (2-3%), no sticking and clogging when working on wet and weedy vegetation soils. In addition, the screening working bodies must have a sufficiently high operational reliability and be simple in design. To reduce the size of the machine, it is also desirable that they simultaneously transport the mass with an upward movement of the separation.

Most of the separating working bodies, which separate the components according to other characteristics, cannot work satisfactorily if there is a large amount of fine soil in the separated mass. Thus, the performance of the subsequent more complex separating devices designed to separate solid impurities or moist soil depends on the quality of their work. When working in optimal soil conditions, for the separation of tubers from the soil, no other working tools are required except for sifting ones.

Although more than a century has passed since the invention of the bar elevator, on most domestic and foreign potato harvesters for separating (separating) soil from tubers, it remains the main working body. The bar elevator has become widespread due to its simplicity of design and the ability, simultaneously with separation, to transport the seam upward at an angle of inclination of 20 -25□. The harvester, in contrast to stationary ones, moving across the field with a change in the relief changes its position relative to the horizontal: tilting the machine to the side forward or backward inevitably causes changes in the movement of the mass if it is

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processed by shaking surfaces (rocking screens, etc.).

The mass is dumped to one side if the machine is tilted to one side, it is delayed, accumulating on the screen if the machine tilts forward: finally, it moves faster than necessary to the exit if the machine tilts back. The elevator type of the separating working body is less sensitive to such changes in position by machines.

The following basic requirements are imposed on working bodies of this type: high performance for separating working bodies (up to 150 kg / cm2), high completeness of soil separation (70-80%), minimal losses and damage to tubers (2-3%), no sticking and clogging when working on wet and weedy vegetation soils. In addition, the screening working bodies must have a sufficiently high operational reliability and be simple in design.

Work to increase the durability of elevators is carried out in several directions by using more wear-resistant materials, increasing the sliding friction area by elastic deformations of rubberized belts. For example, welding on double hooks increases the service life of the hook elevator by about 1.5 times.

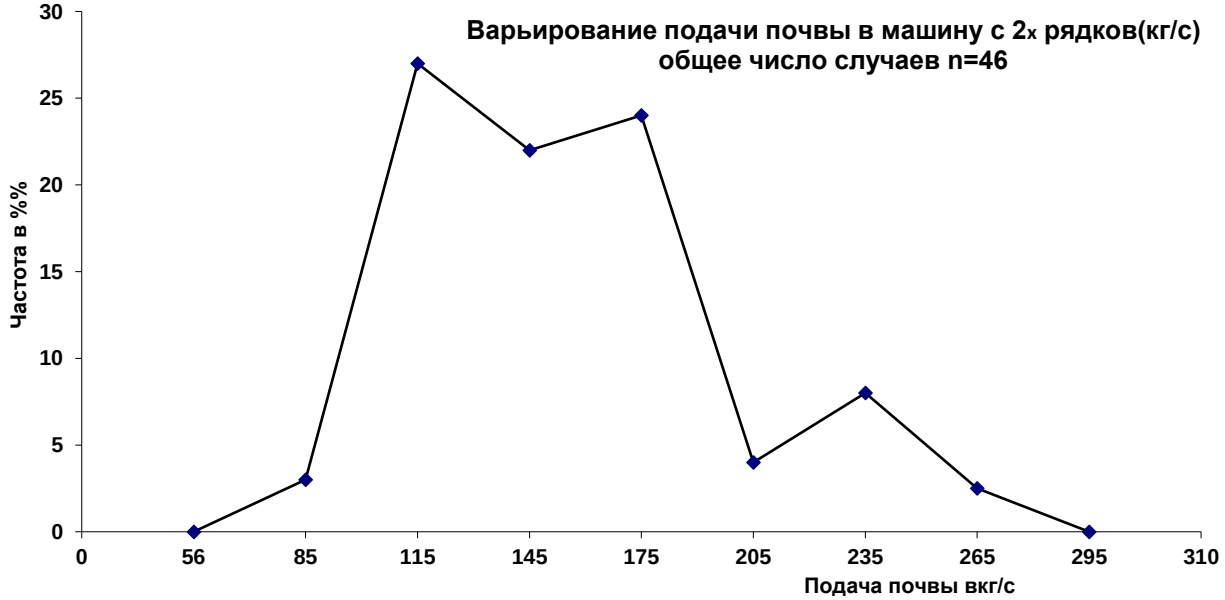


**Figure 1.3.**

The wear resistance of the elevator, the web of which is assembled from cast bushing links, increased due to an increase in the contact area. The elevator can handle 50-60 hectares until it is completely worn out. Diggers KST-1,4, KTN-2V have a bar web of this type. The digger's elevator consists of two blades separated by a middle wall to which the middle share is

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attached. The disadvantage of this design is the high labor intensity of manufacture as well as a relatively large mass.

In the CIS countries, potatoes are cultivated in a variety of soil and climatic zones, and the weather during the harvesting period is unstable. The volume of potato production, as indicated earlier, is very significant. The area allotted for this crop in most farms exceeds several hundred hectares. In this regard, agriculture in the CIS countries needs high-performance harvesting equipment, mainly combines, which would combine high productivity, adaptability to a variety of harvesting conditions, a minimum of manual labor costs with a limited range of equipment production.

We, NPO VISKHOM, together with the Ryazan Agricultural Institute, carried out a number of studies, the purpose of which was to identify possible ways of creating on the basis of the KST-1.4 potato digger, the KKS-1.4 potato digger-separator for operation in difficult soil and climatic conditions.

Justification and study of one of the ways in solving this problem is the content of this work

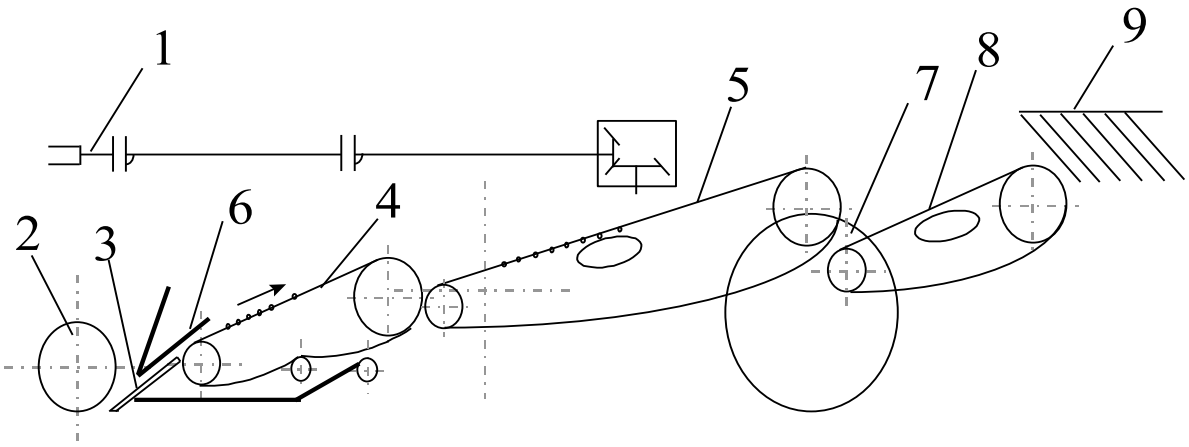


**Figure 1.12. Technological scheme of the potato digger KST-1.4.**

The potato digger KST-1.4 (Figure 1.12) is a semi-mounted elevator, the main components of the potato digger are gear 1, copying wheel 2, plowshares 3 high-speed elevator 4, main elevator 5, frame 6, running wheel 7, cascade elevator 8, reflector 9, transverse hinges 10

The cut and partially destroyed layer is fed to a high-speed elevator with a speed of 2.02 and 2.25 m / s. From the high-speed elevator, the mass enters the main elevator, where due to the

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significant separation surface of the web and shaking it with special shakers, the main separation of tubers from the soil occurs. From the main elevator, the tubers and the remaining impurities are fed to the cascade elevator, where there is a further separation of the soil and the placement of tubers and remaining impurities on the surface of the field.

Using the results of research / 8 / it is not difficult to consider that during normal operation of a high-speed elevator, the descent of soil from it does not exceed 20-25 kg / sec. This means that the cascade elevator works with an underload, which will lead to increased damage to potato tubers.

This is especially noticeable when working in light conditions, is it necessary in this regard to develop an undercutting tool capable of providing a higher cutting of the formation? No. Apparently, the most rational for these conditions is to change the design and technological schemes of the potato digger KST-1.4, by introducing an additional working body, which was implemented in the potato digger-separator, by interchangeability of the loosening drum with the pressure cylinder.

As a result of searches and analyzes and in joint work of NPO VISKHOM with the Namangan production base for the production of potato seeds and vegetables and melons in NITI, a potato digger-separator KKS-1.4 - "Uzbekistan" / rice. 1.13 /

An attempt to modernize a serial harvester in the direction of increasing its productivity by increasing the separation surface and some changes in speed conditions and designs of working bodies without fundamentally changing the technological scheme of the harvester did not give positive results. Therefore, taking into account the shortcomings of the existing combines, solving the issue of creating a machine for harvesting potatoes in the conditions of Uzbekistan, we tried to create machines on the basis of existing machines, introducing appropriate new working bodies into it, made it workable in the conditions of Uzbekistan. When creating the harvester, it was found that the pressure cylinder can, by centrifugal separation, ensure the rise of tubers upward.

Based on the results of the research carried out by us on the experimental installation, the layout of the pressure-pressure cylinder in the potato harvester was determined.

Since 1982, together with NPO VISKHOM and GSKB Ryazan and the Ryazan Agricultural Academy of Agricultural Institute, work has been carried out at NITI to create a loader digger

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Kp-2.

**The Proposed Scheme Of The Combine**

This potato digger-loader is based on the KST-1.4 potato digger. In this machine, the separation of tubers from the soil and their lifting for loading into the body of the vehicle is carried out by a new device, a lifting centrifugal separating bar elevator / LCSBE /.

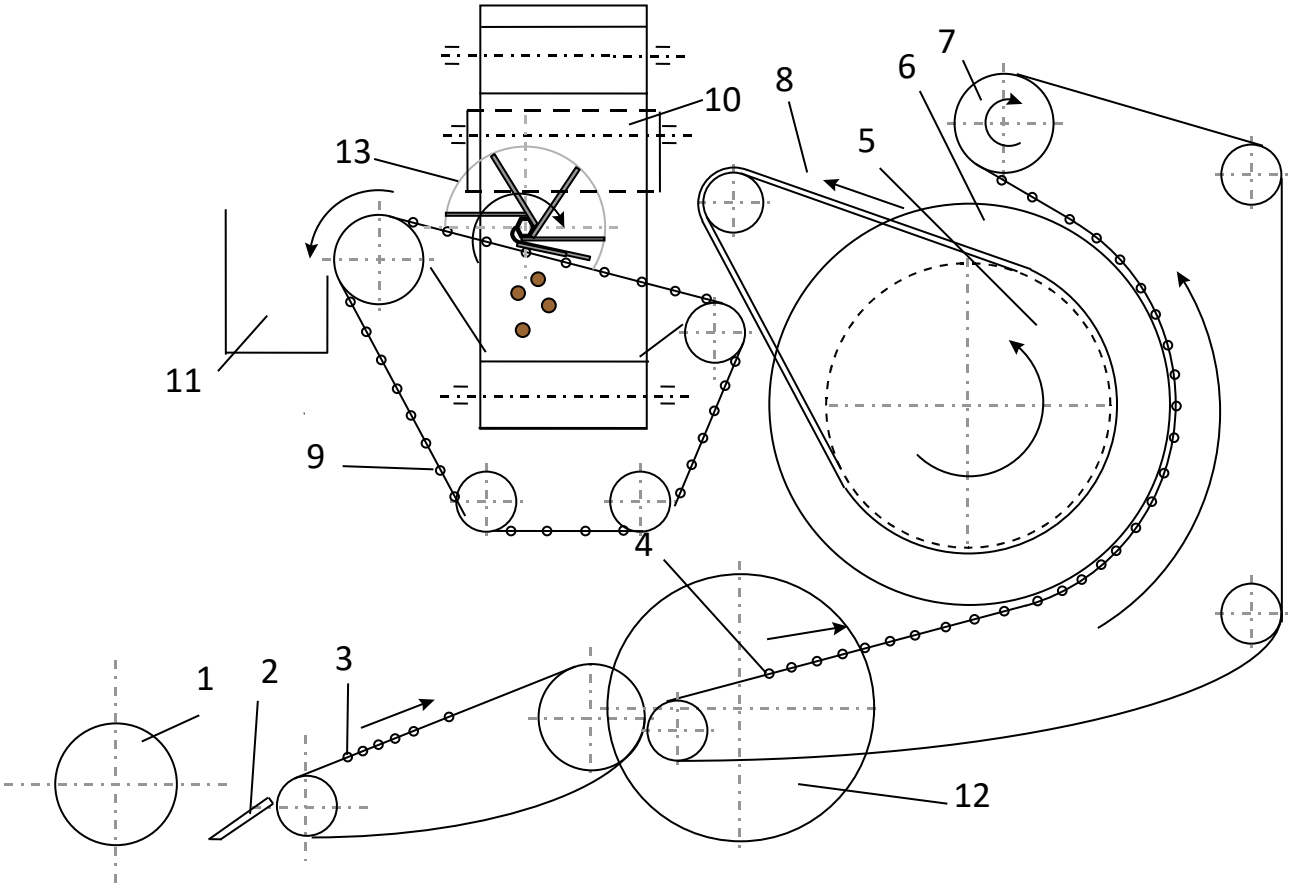


**Figure 1.14. Schema of the KP-2 potato harvester**.

1-support roller; 2-undercut plowshares; 3-bar elevator; 4-lift separating elevator; 5-guide drum with 6 flanges; 7-drive shaft of the second elevator; 8-feeding belt conveyor; 9-haulm rare-bar elevator; 10-cross-loading conveyor; 11-defoliating grid; 12-way wheels; 13-bitter.

**Results**

Figure 1.14 shows a diagram of a potato loader-machine, which, after digging out potatoes and separating tubers from soil and other impurities, loads them in a row of transport. This device separates the soil by centrifugal forces, and the lifting of the tubers produces a difference from

known machines, without buckets or blades. A drum with a belt conveyor is located concentrically to the belt of the centrifugal elevator. Tubers, rising up on a centrifugal elevator, fall further on to a belt conveyor, which immerses them in the body of a vehicle. There is a gap between the belt conveyor on the drum and the centrifugal elevator, which is set within 30 ... 120 mm depending on the soil and climatic conditions and the size of the tubers. For work, it is necessary that the tubers are lifted by a lifting and separating device. The potato digger-loader is protected by RF patent No. 2048726.

**Conclusion**

1. The main separating working body of potato harvesters is a bar elevator, which, simultaneously with separating tubers from the soil, ensures reliable transportation of the tuberous mass.
2. The efficiency of the separation process on potato harvesters largely depends on the condition of the soil.
3. The analysis of the existing separating working bodies showed that they do not sufficiently ensure soil separation in different soil and climatic conditions.
4. The use of centrifugal forces can significantly increase the intensity of soil separation.
5. A promising lifting centrifugal-separating working body (PCSPE) is proposed, which provides improved soil separation and lifting tubers for loading them into the body of a vehicle.
6. The most adapted machine for work in difficult soil and climatic conditions is a potato digger-loader KP-2, which includes a lifting centrifugal-separating bar elevator.

**References**

Maksimov B.I. Search and study of a new separating working body of potato harvesters for work on heavy soils with high humidity: Author's abstract. diss. Cand. tech. Science - Moscow 1985.-20s.

Maslenkov. I.N. Research and comparative evaluation of rotary separators of potato harvesters - Diss. Cand. tech. sciences. M, -1974.-126 p.

Maximov L.M. Structural research and investigation of the operation of a drum separator of agricultural materials with a self-cleaning surface. Abstract of a thesis. Cand. tech. nauk.

Maksimov B.I. "Research of the centrifugal separating body of potato harvesters", "Agricultural machines" No. 6, 1957