

STUDY ON THE TRANSFORMATION OF THE FPL-4 CUTTER FOR GERMINATION BED PREPARATION AND MAINTENANCE IN VEGETABLE GROWING

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ABSTRACT

The paper presents a theoretical study on the possibility of making an agricultural milling cutter for germinating bed preparation and crop maintenance in vegetable growing. The studies were done starting from the frying cutter in FPL-4 vegetable growing.

Only part of the transmission of the machine from the power take-off of the tractor will be used from the FPL-4, the rest of the components being completed by the author, ie the components of the work section, the transmission components and the rotors with the work bodies grouped by two on a mechanism which allows them to rotate horizontally so that a plant protection zone can also be provided during maintenance.

MATERIAL AND METHOD

As a material, the FPL-4 (FPL-4 technical note) vegetable broom was used, a vertical rotor from a Maschio Gaspardo Aliante 300 vertical rotor harrow.

For calculating the sides of the triangles resulting from the change of the position of the rotors in the orizontals plane, he used the Generalized Pitagora Theorem (Cosine Law), namely:

$$a^2 = b^2 + c^2 - 2cx ;$$

when the side opposes a sharp angle (fig.1)

$$a^2 = b^2 + c^2 + 2cx ;$$

when the side opposes a obtuse angle (fig.2)

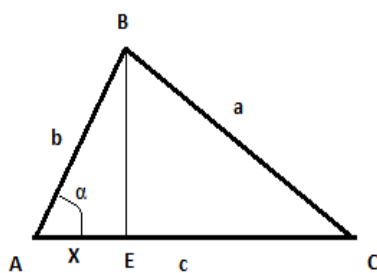


Fig.1

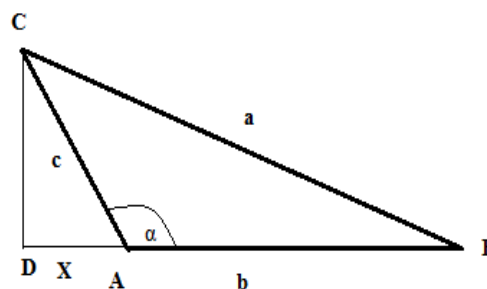


Fig.2

From the studies carried out using the literature (M. Glodeanu 2015) and other sources of information for the preparation of the germinating bed and maintenance of the crops in the vegetable-growing proposed for the realization, it is an agricultural machine worn on a tractor (I. Saracin 2005), with a number of sections, depending on the power of the tractor serves the preparation of the germinative bed before sowing or planting and can be used for crop maintenance in vegetation, when the distance between the rows is 45-70 cm

Milling construction:

- frame fitted with three-point tractor attachment, hexagonal or square sectional shaft consisting of several sections that can be coupled together. Each frame of the frame is provided with a conical group through which the movement is transmitted to the rotors of the sections (fig. 3).

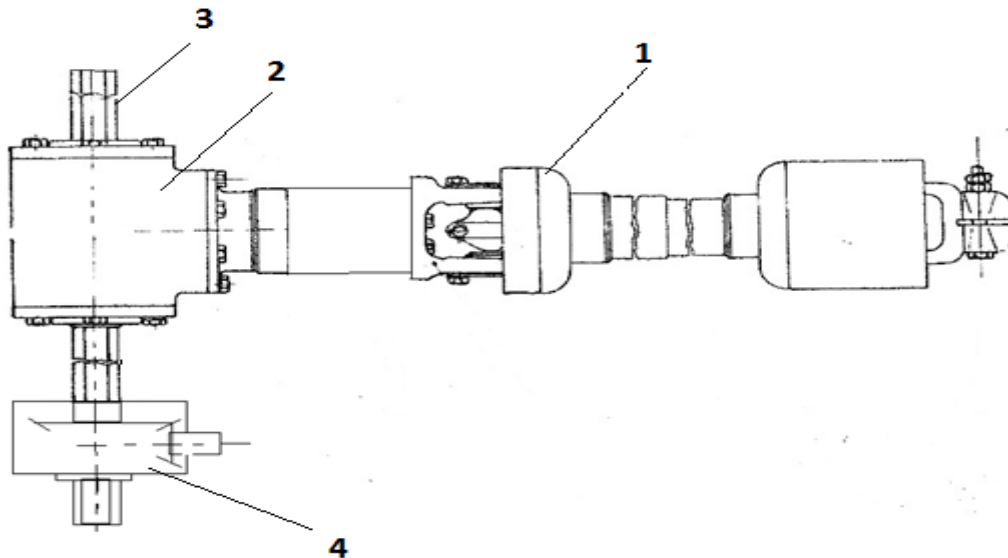


Fig.3 Transmission of the power cutter 1 cardan shaft, 2 main conical group, 3 hexagonal shaft, 4 conic group for transmission of the rotation motion

Transmission of the cutter by a cardan shaft from the power take-off of the tractor, provided with a main conical group that takes the movement from the power take-off and transmits it to the hexagonal or square shaft on which the conical groups that transmit the movement to the active organs are located. (Figure 4)

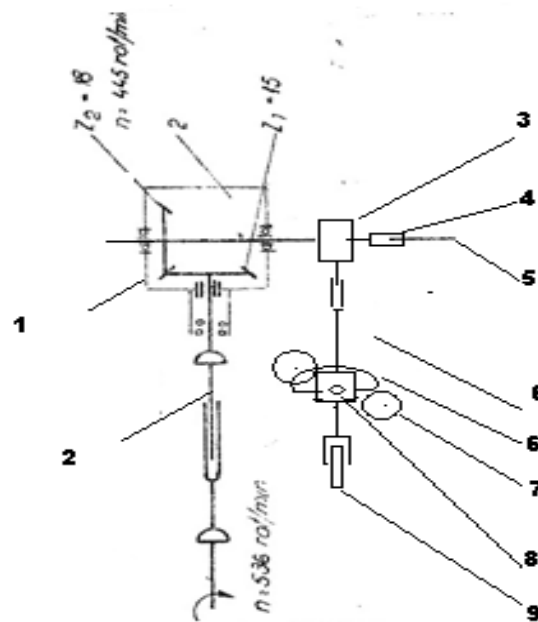


Fig.4. Transmission of the cutter to the section and to the active bodies: 1 cardan shaft, 2 main conical group, 3 conic group for transmission of rotor motion, 4 hexagonal shaft couplings, 5 shaft with hexagonal section, 6 shaft, 7 rotors, 8 conical group of the rotors, 9 the rotating wheel

The work section consists of a frame supporting the cardan shaft which assumes the movement from the conical group on the hexagonal shaft and transmits it to the conic group acting on the rotors on which the knives are located (fig. 5).

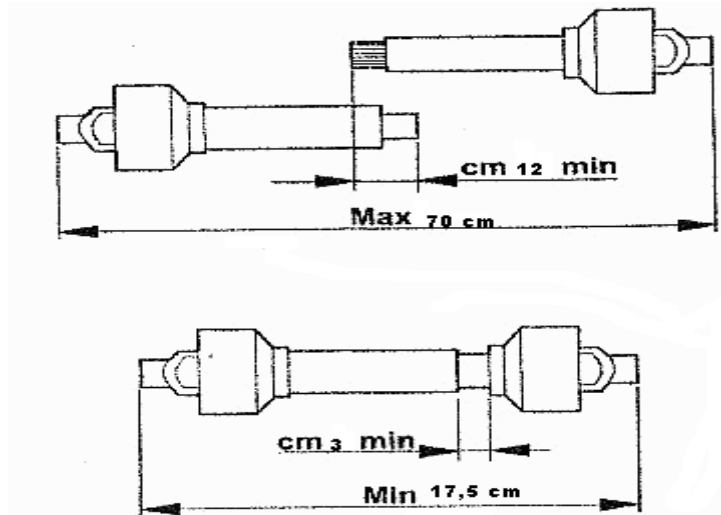


Fig.5 Cardan shafts

In the rear part of the frame is mounted the section support wheel provided with a screw screw mechanism for the depth of work. It has the possibility to move the position to the front part of the rotors (fig.6).

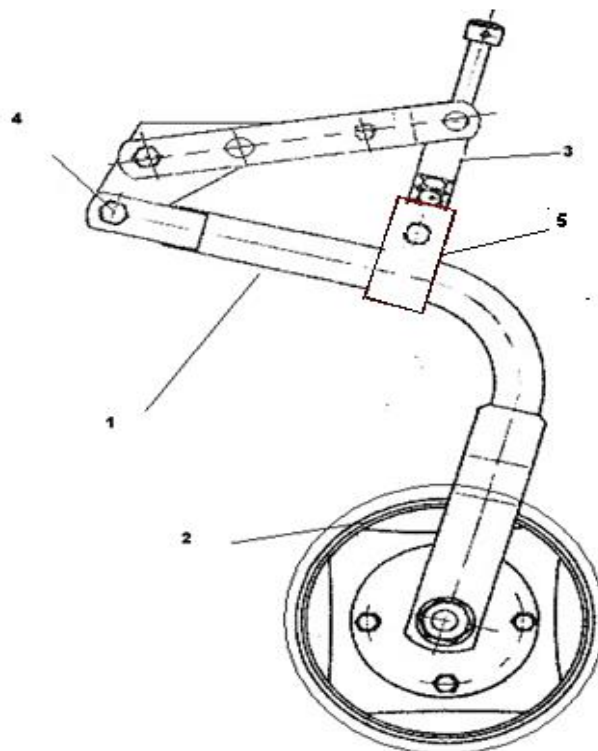


Fig.6 Ground copying wheel: 1-frame, 2-wheel with tire, 3-nut screw mechanism, 4 frame mounting system, 5-wheel changing wheel

The rotors (Fig.7 and 8) are each provided with a conical group, receive the rotation movement from the conical section of the section, are mounted on a metal support with several holes so that by rotation in horizontal plane the protection zone (it is possible to state the degree of each hole is realistic), thus knowing the width of the protection zone or the on-site tests shown in Figure 9. The engine speed is 300 rpm, the rotor working width is 35 cm.

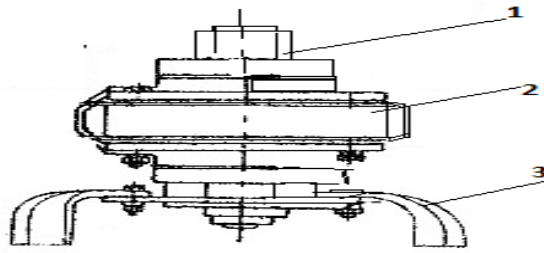


Fig.7 Rotor of section 1: shaft, 2-body, 3-knife

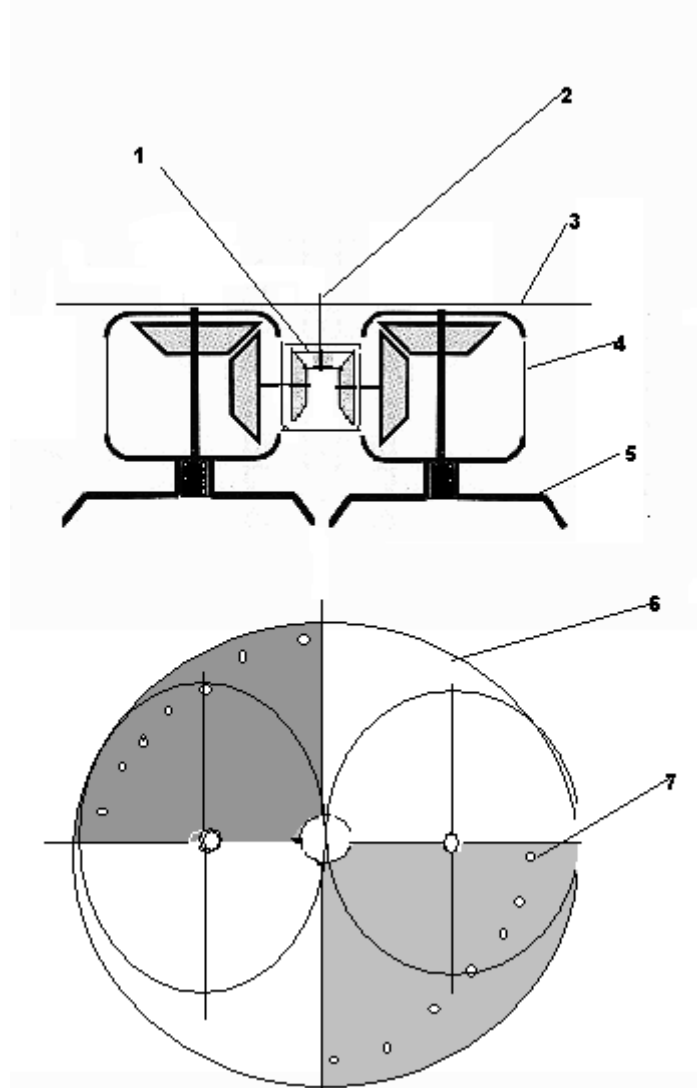


Fig. 8 Assembly of rotations: 1-shift. 2-conical group 3-support 4-conical group, 5-cuter, 6-rotari support, 7-adjustment holes in the protection zone

The working process shown in Figure 8 exemplifies how the milling cutter can be used for germinating bed preparation when all the rotors are positioned in a line machining the soil across the entire working width or in a rotated position on the orifice holder when the protection area is secured.

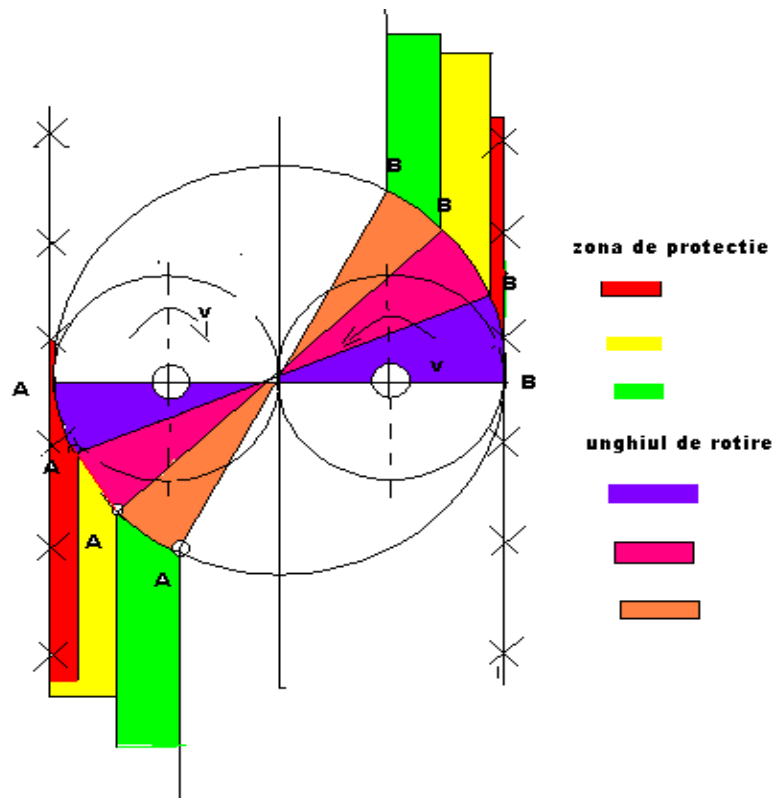


Fig. 6 Milling process (theoretical study)

CONCLUSIONS

- From the studies carried out, it has been found that until now there is no vertical rotor milling cutter for the preparation of the germinating bed and the maintenance of the vegetable crops
- The milling cutter can be made, and through the component parts ensures long service life
- Some of the components require periodic maintenance
- It is advisable to use tractors equipped with a hydraulic system with automatic position control
- Higher working depths can also be achieved by changing knives

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