Electromagnetic Energy, power machinery resource dose эlektromahnytnoy energy, obrabotku Exposition, development and GROWTH plants.

The results of studies that demonstrate the effect of electromagnetic energy to activate the development of plant facilities.
Electromagnetic energy, energy resources, dose of electromagnetic energy, exposure processing, development and growth of plants.

RESEARCH dynamics of seed
In the loading device

VM Pryshlyak, Ph.D.
Vinnitsa National Agrarian University

Presented design installations for the production of seed tapes that can have practical use in sowing crops in gardens, greenhouses, research and other areas. The dynamics of the movement of seed drills to boot devices and Analytical dependence for determination of kinematic and structural parameters of design and graphics built depending on the movement of grains to changing conditions and modes.
Seed tapes, seed, dynamic movement, loading and molding device.

Formulation of the problem. Design of many agricultural machines, including seeding drills and other devices impossible without the determination of kinematic and dynamic parameters of movement of materials on working surfaces of machinery. In the seeding apparatus moving particles can occur with the interaction with other elements or without them. Therefore, the definition trajectories of individual particles and the parameters of their interaction with surfaces, including the moving parts of devices is an important scientific problem to solve.

Analysis of recent research. Questions sowing grain materials, study of kinematic and dynamic parameters of machines for sowing leguminous, technical and other agricultural crops were engaged P. Vasilenko [1], BM Hevko, OL Lyashchuk, YF Pavelchuk, VN Pryshlyak, II Chvartatskyy, ML Zajac,

RI Lototsky [2, 3], P. Zaika [4], VP Chichkin [5], E. I. Gruzdev, RG Myrzoyev, VI Yankov [6] Herman H. [7] and others. However, a number of issues requiring further research.

The purpose of research - Development of installations for the production of seed drills to boot devices with determination of kinematic and dynamic parameters.

Results. Installation for the production of seed tapes (Fig. 1) is designed as a frame 1, on which all components are mounted. On the left side of the frame set left vertical rack 2 and end on the right - the right vertical rack 3. Bottom left vertical rack 2 on the bracket 4, 6 axis installed corrugated Bay 5 with the ability to turn the circular. The right vertical rack 3 at the top of the axis 7 installed flat ribbon 8 with the ability to turn the circular. 2 between the left and right vertical uprights 5 installed conveyor 9.

In the corrugated strip 5 distance between adjacent corrugated grooves 10 11 is equal to the distance between the grains in their seeding the ground. With its corrugated unwinding tape 5 is in conjunction with the left end of the conveyor belt 9. In addition, while moving conveyor belt 9, on which the corrugated band 5 of 12 seed, such as sugar beet and dose of fertilizer 13, which is fed from the dispenser 13 known design, installed on the bracket 14 at corrugated band 5 on the conveyor belt 9. Submission of mineral fertilizers is carried out automatically by the photocell 15 is rigidly fixed bottom feeder known manner, and the left end of the conveyor belt on the bracket firmly established unit of output grains spherical nest in cavities. The second machine fertilization 13 famous structures found on the second bracket while moving conveyor belt that runs from photocell installed beneath it. In the bay smooth tape 8 on the bracket 16 installed molding tool toothed 17 teeth which are placed evenly in a circle, the distance between the teeth 18 is equal to the distance between adjacent seeds 12 located on the lower corrugated strip. Floor left end of the conveyor belt 9 rigidly on the bracket 19 installed odnozernovyy seeding device with nasinnyeukladachem 20 21 12 seeds in the lower corrugated strip 10. The left end of the frame 1 is set drive 22 through which the drive mechanisms of all known manner. Winding seed tapes with seeds carried into the bay 23 on the axle 24, mounted on pedestals 25. Control device made from a control panel 26.
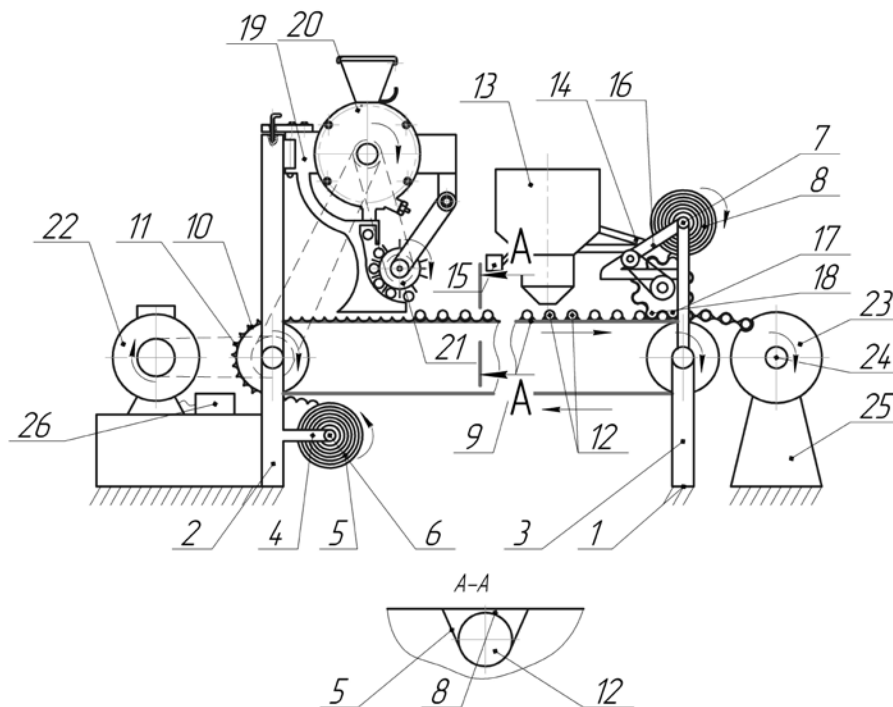
Fig. 1. Installation for the production of seed tapes.

The apparatus is as follows. Corrugated band 5 unwound and using the tape end is fixed to the belt conveyor belt 9. A setup of the device, after which the device is installed to the stand and the process of gluing seed tapes with seeds. Belt conveyor 9 delivers corrugated strip 5 during seeding device 20 is using 21 nasinnyeukladacha invested in 12 seed slot 5 corrugation. In a further move of 8 bays is supplied flat ribbon 8, using the molding tool 17 and 18 teeth made from gluing corrugated side 12 of the top seed smooth ribbon 8, which are covered by appropriate adhesive. Then the seed tape wound on the axle 24 in bay 23 at stand 25.

During the grain feed materials in planters working bodies blade speed of seed can reach significant quantities may cause injury to the seed. Besides possible injury seeds in conditions of simultaneous movement on his shoulder blade and the cylindrical surface of the shell drills. Therefore, it is important to investigate the velocity of the seed and the length of the groove on which a grain fed. Design model coulter blade working body shown in Fig. 2.
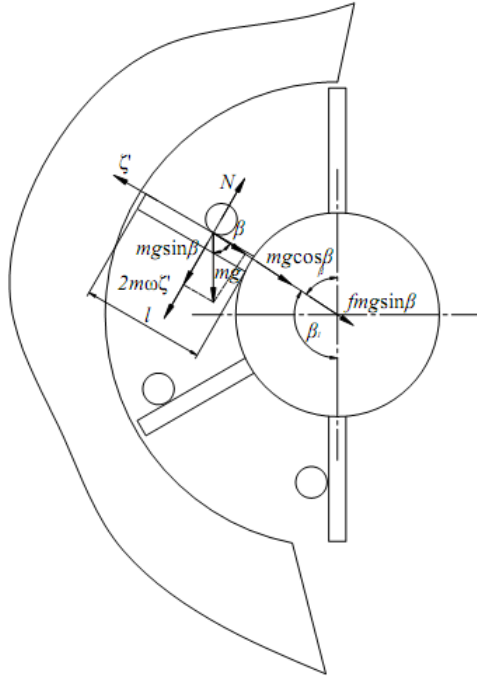
270

Fig. 2. Diagram coulter blade working body in the area of discharge.

When rotating blades, a grain that arrived on the surface, will rotate with it and move on its surface. When you turn on a corner β_1 will carry only a grain oscillating movement after the turn at an angle $\beta > \beta_1$ a grain will move radially along the blade. Thus the seed, the following forces:

- Gravity seed: $G = mg$ where m - Mass of grain, kg; g - Acceleration of gravity, m / s2.

- Centrifugal force $F_s = mr\omega^2$ where r - Seed placement radius, m. ω - Speed Paddle working body.

- Coriolis force - $F_{\kappa} = 2mr\omega\xi'$ where ξ - Velocity of grains along the blade, m / s.

- Friction $F_m = f \cdot N$ where f - Coefficient of friction between the grains and the surface of the blade; N - Normal reaction blades.

The sum of the projections of all forces acting on the grains in the direction perpendicular to the surface of the blade:

$$N = 2m \cdot \omega\xi' + mg \cdot \sin\beta .\tag{1}$$

The amount of force projections:

$$m\xi'' = r\omega^2 - mg\cos\beta - fN .\tag{2}$$

After conversion:

$$m\xi'' = r\omega^2 - g\cos\beta - \frac{t}{m}N .\tag{3}$$

Substitute formula (1) in the formula (3):

271

$$m\xi'' = r\omega^2 - g\cos\beta - 2m\cdot\omega\xi' - fg\cdot\sin\beta.$$

Taking into account the fact that $r = \zeta$ Equation (4) is written as follows:

$$\xi'' + 2t\omega\xi' - \omega^2\xi = -g\cos\beta - tg\sin\beta. \tag{4}$$

With a uniform rotating blade wheels:

$$\beta = \omega t. \tag{5}$$

Therefore, equation (5) is written as follows:

$$\xi'' + 2t\omega\xi' - \omega^2\xi = -g\cos\beta - tg\sin\beta. \tag{6}$$

The general solution of equation (7) consists of additional features ξ_1 and partial solution ξ_2:

$$\xi = \xi_1 + \xi_2. \tag{8}$$

The roots of the characteristic equation are equal additional features [1]:

$$\lambda_1 = \omega(-t + \sqrt{1+t^2}, \tag{9}$$

$$\lambda_2 = \omega(-t - \sqrt{1+t^2}. \tag{10}$$

This additional function can be represented as follows:

$$\zeta_1 = c_1 e^{\lambda_1 \cdot t} + c_2 e^{\lambda_2 \cdot t}. \tag{11}$$

A partial solution is:

$$\zeta_2 = -A\sin\omega\cdot t - B\cos\omega\cdot t, \tag{12}$$

$$A = \frac{2fg}{2\cdot\omega^2(1+t^2)}, A = \frac{-f^2\cdot g + g}{2\cdot\omega^2(1+t^2)}.$$

Substituting the value of equation (11) and (12) in the formula (8) we obtain:

$$\zeta = c_1 e^{\lambda_1 \cdot t} + c_2 e^{\lambda_2 \cdot t} - \frac{2fg\sin\omega t}{\omega^2(1+t^2)} - \frac{g(1-t^2)\cdot\cos\omega t}{2\omega^2(1+t^2)}. \tag{13}$$

Constant c_1 and c_2 find out the initial conditions: at $t = 0; \zeta = 0$; $\zeta' = 0$:

$$c_1 = \frac{g\cdot\lambda_2(1-t^2) - fg\cdot\omega}{2\cdot\omega^2(1+t^2)(\lambda_2 - \lambda_{1)}}, c_2 = \frac{2\cdot fg\cdot\omega - g\cdot\lambda_1(1-t^2)}{2\cdot\omega^2(1+t^2)(\lambda_2 - \lambda_{1)}}.$$

The speed of the seed find differentiating equation (13):

$$\zeta' = c_1\cdot\lambda_1\cdot e^{\lambda_1 \cdot t} + c_2\cdot\lambda_2\cdot e^{\lambda_2 \cdot t} - \frac{fg\cos\omega t}{\omega\cdot(1+t^2)} - \frac{g(1-t^2)\cdot\cos\omega t}{2\omega(1+t^2)}. \tag{14}$$

Time t During which a grain reaches the top of the blade:

$$t = \frac{l}{\zeta'}, \tag{15}$$

where: l - The length of the blade, m.

To ensure contact is only seed with a spatula within the cylindrical shell particles drills necessary that the condition was provided:

$$l \geq \frac{\beta_1}{\omega} \cdot \zeta ,$$

where: β_1 - Angle blades within the cylindrical zone.

In addition to minimizing injury seed is necessary that the condition:

$$\zeta' \leq \zeta'_{max} ,$$

where: ζ'_{max} - The maximum permissible impact speed grain, m / s.

Maximum speed Paddle working body can be found from the formula (14), substituting the appropriate values.
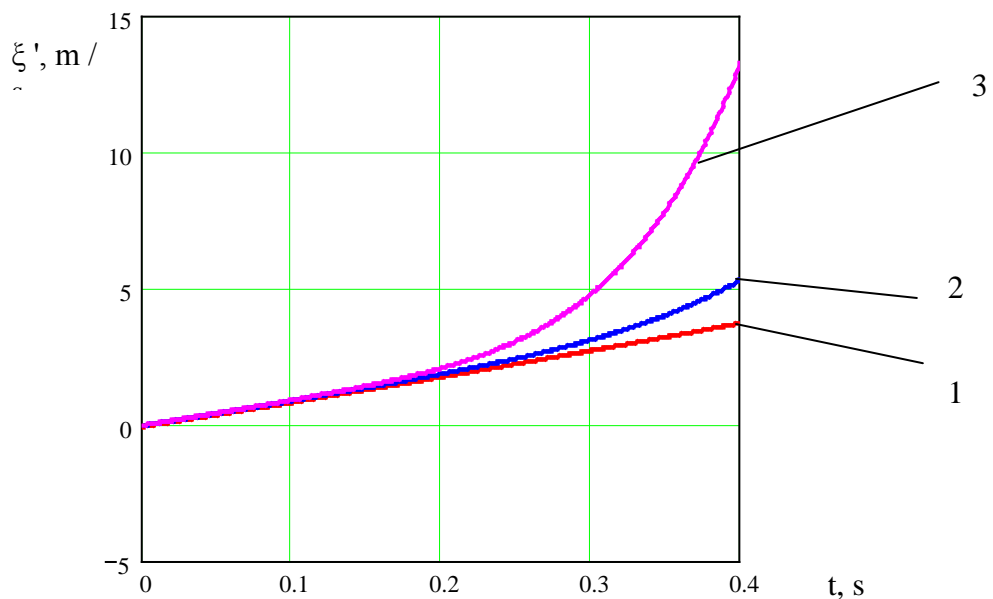

Fig. 3. Schedule changes the velocity of the seed in time f = 0,15: 1 - ω = 4 rad / s; 2 - ω = 8 rad / s; 3 - ω = 12 rad / s.

Fig. 3 show the change in velocity of the seed in time, if the coefficient of friction f = 0,15. Fig. 4 shows a graph seed moving in time, if the coefficient of friction f = 0,15.
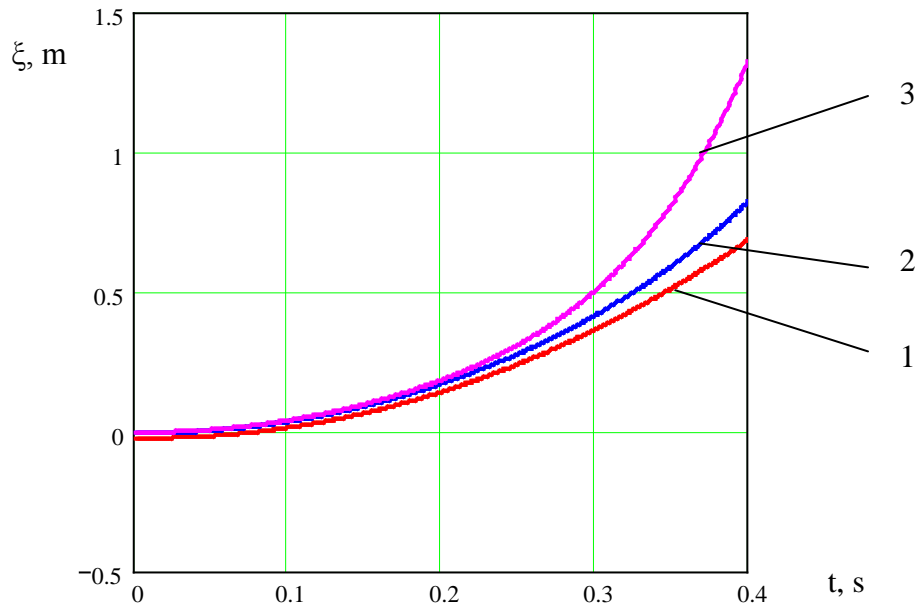
Fig. 4. Schedule seed moving in time with f = 0,15: 1 - ω == 4 rad / s; 2 - ω = 8 rad / s; 3 - ω = 12 rad / s.

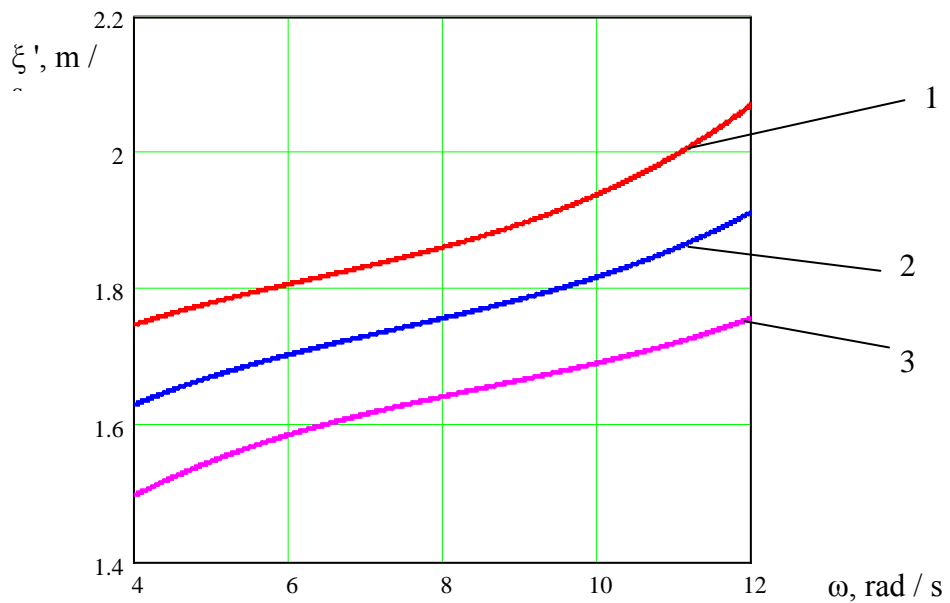Fig. 5 shows a graph of the velocity of the seed of the speed Paddle working body at t = 0,2s.

Fig. 5. Schedule changes in the velocity of the seed of the speed Paddle working body 0,2s t = 1 - f = 0,15; 2 - f = 0,2; 3 - f = 0,25.

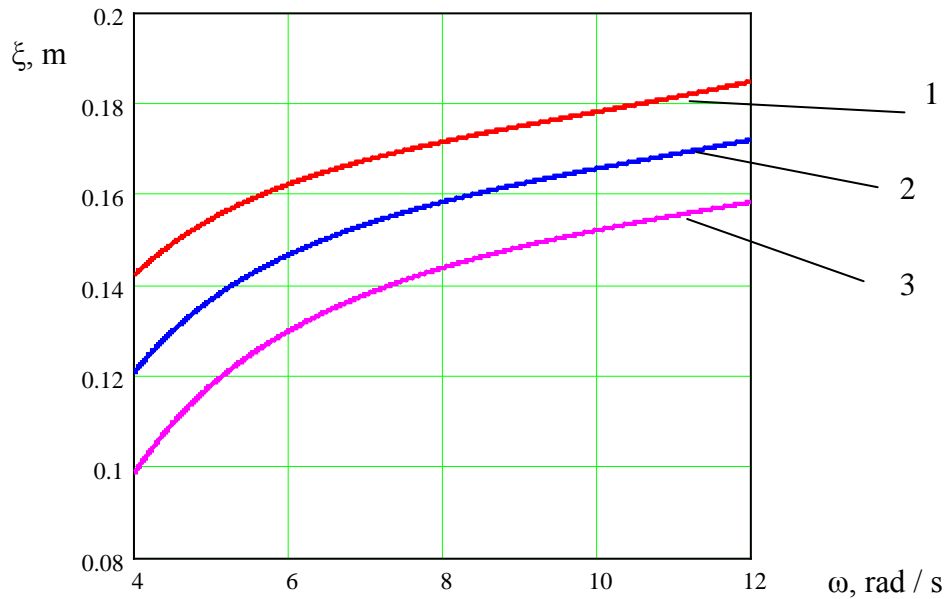Fig. 6 shows a graph of the movement of seed of the speed Paddle working body at t = 0,2s.

Fig. 6. Schedule changes move the seed of the speed Paddle working body 0,2s t = 1 - f = 0,15; 2 - f = 0,2; 3 - f = 0,25.

As shown in the charts, with increasing time and the angular velocity of the seed of the linear velocity also increases. It is recommended when selecting kinematic parameters setup mechanisms for making seed tapes use the above-mentioned graphical dependencies.

Conclusions

1. Developed dynamic movement of seed drills and loading devices Analytical dependence for determination of kinematic and structural parameters. The result obtained by solving the equations of motion built graphics depending grains of different variables.

2. The design of installations for the production of seed tapes may have practical use in planting crops in gardens, greenhouses, research and other areas.

List of references

1. P. Vasilenko theory of particle motion on surfaces sherohovatыm agricultural machines / P. Vasilenko. - K .: USHA, 1960. - 284 p.
2. Technological bases of designing and manufacturing sowing machines: Monograph / BN Hevko, OL Lyashchuk, YF Pavelchuk, VN Pryshlyak and others. - Ternopil: Ed. TNTU Ivan Pul'uj, 2014. - 238 p.
3. *Hevko BM* Mathematical modeling of grain on moving surfaces sowing machines / BM Hevko, RI Lototsky, VN Pryshlyak // Agricultural Machinery. - Vol. 26. - Lutsk Lutsk RIO NTU, 2013. - P. 27-35.
4. Zaika PM Theory of agricultural machinery. Volume 1, Part 2. Machines for sowing and planting / P. Zaika. - H .: Eye, 2002. - 452 p.
5. Chichkin VP Ovoschnыe seyalky and Combined Assemblies. Theory, Constructions, calculation / VP Chichkin. - Chisinau, granary, 1984. - 391 p.

6. E. Gruzdev I. Theory shnekovыh devices / E. I. Gruzdev, RG Mirzayev, *VI Yankov*. - L .: LSU, 1978. - 144 p.
7. Herman H. Shnekovые mashiny in technology / H. Herman / s Transfer Nam. *LG Vedenyapynoy* / Under Global Ed. ML Friedman. - L .: Publishing House "Chemistry" otdelenie Leningrad, 1975. - 280 p.

Constructions is designed for installation Production semennыh Lant, kotoryya mogut ymet Practical Using poseve at selskohozyaystvennыh crops on pryusadebnыh, teplychnыh, scientific yssledovatelskyh and second tracts. Semennыh motion dynamics of research materials in zahruzochnыh devices seyalok and vыvedenы analytycheskye dependence for kinematically definitions and parameters konstruktyvnыh development, with this movement be built graphic dependence grains for variable uslovyy regimes and work.

Semennыe RIBBONS, grain, motion dynamics, and formovochnыe boot device.

The construction of installations for production of seed tapes that may have practical use in sowing crops in gardens, greenhouses, research and other areas is presented. The dynamics of the movement of seed drills to boot devices and analytical dependences for determination of kinematic and structural parameters of development, with built motion graphics depending grains to changing conditions and operating modes are done in the article.

Seed tapes, grain, dynamic of motion, loading and molding devices.