14. *ChaplыhyMr. VN*. Electromagnetic method obnaruzhenyya Registration and growth of fatigue treschyn / *VN. Chaplygin, GV Ababkov* // Questions avyatsyonnoy science and technology. - 1995. - № 1. - P. 241-246.
15. *Bydand G.* Koэrtsytymetryl nondestructive inspection / *GV. Byda, AP Nychypuruk* // Defektoskopyya. - 2000. - №11. - P. 1-29.
16. *Vildanain RG* Mahnytnыand yntroskop for control structures obolochkovыh neftyanoy and neftehymycheskoy industry / *R.H. Vyldanov* // Neftehazovoe case. - 2003. - P. 1-6.
17. *ColleaguesMr. VP* Tehnycheskye sredstva dyahnostyrovanyya / *VP. Kolehyn, AV Mozhalevskyy.* - M .: Sudostroenye. - 1984. - 208 p.
18. *Vavyloin VP* Teplovand methods of nondestructive testing: Directory / *VP. Vavilov.* - M .: Mechanical Engineering. - 1991. - 240 p.
19. *WuchangMr. VN* Methody kolychestvennoho vyhretokovoho control parameters Definition with defects / *VN. Uchanyn* // Commercial-diagnostics and nondestructive inspection, 2002. - № 1. - P. 33-38.

For obnaruzhenyya defects in parts of machines and structures elements Broad Application ultrazvukovыe and I send vyhretokovыe defektoskopyy methods. Most vazhnыmy parameters opredelyayuschymy Efficiency of ynoho method defektoskopyy Or, javljaetsja chuvstvytelnost and dostovernost method, Ability obnaruzhyvat without defektы Preparation kontrolyruemoy surface, and trudoemkost The cost control, ego proyzvodytelnost.

Nondestructive control methods defektoskopyy, vyhretokovыy method selskohozyaystvennaya Technology.

To detect defects in machine parts and structural elements widely applied ultrasonic and eddy current flaw detection methods. The most important parameters that determine effectiveness of flaw detection method is sensitivity and reliability of method, ability to detect defects without preparation of test surface, labor and cost control, productivity.

Non-destructive testing, inspection methods, eddy current method, agricultural machinery.

UDC
631.55

Basic theory CALCULATION sectional transporter KONOPLEZHATKY

VA Hrydyakin, Ph.D. Glukhivskiy National Pedagogical University
namesand Alexander Dovzhenko

The process of collecting and hemp are design features calculation sectional transporter to perform this type of operations.

Sectional conveyor konoplezhatka collecting cannabis.

Resolutionska problem. Current technology provides cutting assembly hemp and hemp stalks rozstyl was drying or dewy lobe konoplezhatkoyu LCD 1.9, selection of films spreading stems dry as straw or stlantsevoy trusts with simultaneous narrow in bundles konoplepidbornykom PCR-1, laying a hand in sheaves piles tyukovku bp with simultaneous adjustment strapping them with string PEC-55, loading and hauling bales of field technical means to place locks or skyrtuvannya. Due to the mechanization of handling, this technology reduces labor costs for harvesting hemp. But such operations as the conclusion of sheaves in stacks, tying bales are very time consuming. Snopovyh technology leads to significant labor costs penkozavod. Pereveslo sheaves in the shops processing penkozavod removed and portions are placed manually on a conveyor dryer. In addition, konoplepidbirnyk booming shale trusts hemp has low productivity because of unstable knitting machine to bundle trusts because delayed harvesting times, this leads to large losses grown crop.

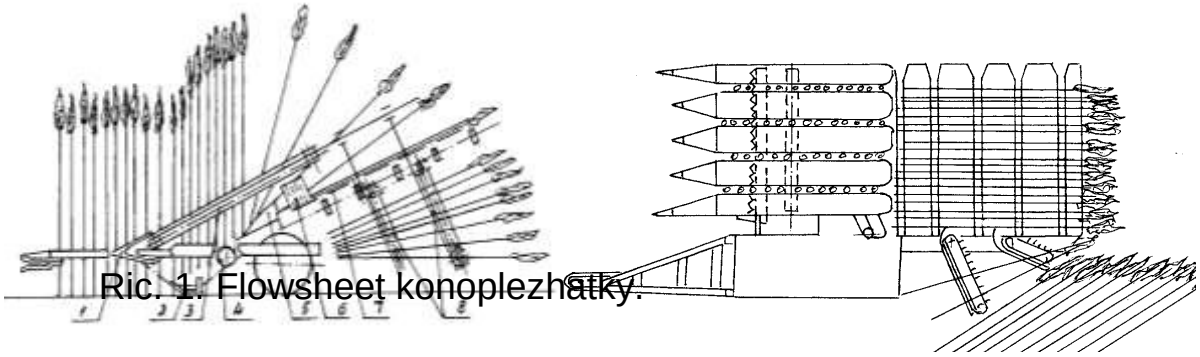
Metand dossurvey findings - WAOSComent technology plaitedof Conopl aimed at reducing labor-intensive operations to be performed manually, technology development and hemp harvesting machinery for its implementation.

AnaLiz recent studies. Technology harvesting hemp while in Zieleniec cooking oil shale trusts involves laying hemp stems in ribbon tape rotation, forming rolls of tape trusts hemp, load them into vehicles for transportation konoplezavod, unloading rolls in stacks for storage or processing plant.

DA conclusion stems in ribbon cannabis use konoplezhatku LCD 1.9 (Fig. 1). Konoplezhatka includes dilylnyky 1, cutting machine 2, sectional transporter 3, 4 potions separator, focusno surface 5, needle conveyor table 7, pidbyyku 6, Rosestylalnyy unit 8.

PEid driving konoplezhatky field dividers 1 share steblestiy the individual strips and sent to the Transport streams sectional transporter 3 transporter sectional Feed

zatyskayut stems that are both cut off Header 2 and vertically transported to the table needle transporter 7. At the exit of the sectional conveyor limbs stems in its path facing thrust surfaces 5 (Figure 2) and returned to Pasach sectional transporter in the direction of their movement . Angle to the horizontal stems, while approaching the slope angle needle conveyor table that provides stalks laying on the table needle feed conveyor in parallel with targeted stems.



Ric. 1. Flowsheet konoplezhatky.

Golchatyy transporter grabs and moves to stem roztyralnoho apparatus. On the path of the lining 6 aligns limbs stems. Roztylalnyy device enters stems in ribbon on the cut of the field at an angle to the direction of motion of turning their tops back and right side in neskoshenoho field.

The most difficult process is konoplezhatky stems sectional transporter transporting and laying them on
Needle conveyor table with a ribbon oriented parallel to each other stems. Time and motion observations show that 80% of all violations of the process konoplezhatky accounts for sectional transporter.

Grountovni daboutslidzhennya sectioniynyh
Maynsporteriv aboutled GI.
Pottera. He established the relationship between the clamping force stems, their diameter and width belts.

$$P < d_{cm}(0{,}014b_n 0.32) \quad (1)$$

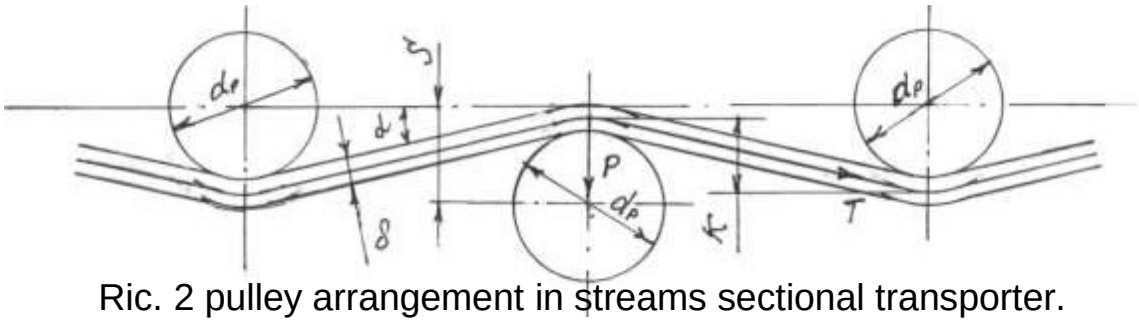
where d_{cm} - Diameter stems, mm; b_n - widthand transporting movement, mm.

Toslidzhennya GI Goncharova sectional transporters conducted in the 60's of last century. Therefore, the actual importance of research to improve the technical and operational performance of the sectional conveyor reaper and the whole subject of modern designs and operating conditions konoplezbyralnyh machines, physical and mechanical properties of stalks of hemp proposed collection technologies.

EID-identification tension and pressure forces conveyor belts sectional.

Pereplacement of stems in the sectional conveyor provided reliable clip to fasten them together. Determine the force youUWC movement and tension in streams sectional transporter.

In section conveyors konoplezbyralnyh used cars zigzag arrangement pulley in streams. Scheme stream sectional conveyor shown in (Fig. 2).



Ric. 2 pulley arrangement in streams sectional transporter.

Yousk movement to stem depends on the structural parameters of the stream sectional transporter.

Curvature K creek define:

$$K = (d_p + 2\delta - S) \quad (2)$$

where d_p - Diameter roller; δ - t h e n vschyna belt; S - the distance from the axis of the roller to the outer surface of the belt.

The forces acting sectional conveyor streams define a relationship:

$$\frac{K}{l} = tg\alpha = \frac{P}{T} \quad (3)$$

$$P = \frac{K \times T \times \cos\alpha}{l} \quad (4)$$

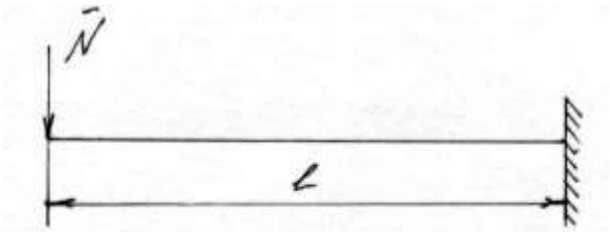
where P - Force pressing movement; - The force of tension leg movement; l - Wheelbase commercials movement.

Power Clipstion passat onguilty Iíllappliance only sifat Sectionlyuschennya stems as determined experimentally for the stems of different diameters. From relationship (4) tension power plays sectional transporter shall not exceed:

$$T = \frac{P \times l}{K \times \cos\alpha}. \quad (5)$$

EID-identification maximum deflection and maximum bending moment that it creates. In the design parameters sectional transporter are essential maximum deflection of the stems and the maximum bending moment,

uoh it creates. To determine the maximum deflection of the stems and the maximum point, consider the lower part of the stem, under strands as cantilever beam zascheplenu (Fig. 3).



Ric. 3. Load komlevu part of the stem.

Tovzhynu stems l of decisionhave from inLanguage altitude capture sectional conveyor belts stem above the ground surface l= 500 mm. Then the maximum bending moment is: $M_{згн} = Nl$.Andof course support materials known that the condition bending strength is:

$$\sigma_{max} = \frac{M_z}{W_z} \leq [\sigma],$$

where M_z - The maximum bending moment; W_z - Static cross-sectional moment of resistance; $[\sigma]$ - Allowable bending stress, take, for softwood.

Welcomeare that the stem is tubular cross-section:

$$W_z = \frac{\pi d^3}{32}(1 - \alpha^4),$$

where d - The external diameter of the stem; $\alpha = \frac{d_в}{d}$; $d_в$ - the inner diameter of the stem; $M_z = W_z[\sigma]$, power N $N = \frac{M_z}{l}$ toIZnachymo: .

Poppysymalnyy aboutbend f_{max} withtebland (Ric. 4) EIDnachymo from

ondispositions rate of resistance of materials.

Dyferentsialne equation stems spring line:

$$\frac{d_y^2}{dx^2} = \frac{M_x}{EI_x} = -\frac{Nx}{EI_x}$$

Kut turn section θ:

$$\theta_{(x)} = -\int P\,x dx = -\frac{Nx^2}{2} + C$$

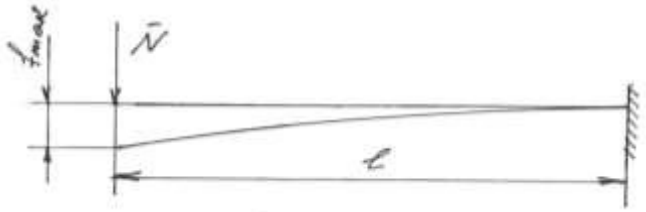
Burning-throughMr. cross-section:

$$y_{(x)} = -\frac{Nx^2 dx}{2EI_x} + Cx + D = -\frac{Nx^3}{6EI_x} + Cx + D;$$

where C and D - the constant of integration.

EIDnachymo with initial conditions: at x = l; $y_{(e)} = 0$; $\theta_{(e)} = 0$.

$$C = \frac{Nl^2}{2EI_x}$$



Ric. 4. Deflection stems.

$$D = \frac{Nl^3}{6EI_x} - \frac{Nl^2}{2EI_x} = -\frac{Nl^2}{3EI_x}; \qquad Y_{(x)} = -\frac{Nx^3}{6EI_x} + \frac{Nl^2}{2EI_x}x - \frac{Nl^3}{3EI_x};$$

where E - modol pruzhness pershohabout $I_x$sort of; - momoment inertia poperechtion section.

Poppysymalnyy deflection at the stem $x = 0$:

$$f_{max} = -\frac{Nl^3}{3EI_x};$$

In theidhyn stems and moments in which they occur as determined experimentally. For stems length of 2000 mm at a distance of 500 mm from the extremities of a diameter d = maximum deflection is f_{max} praction and bending moment M_{max}.

Theortion Maynsportuvannya *stebel* *passes* *Maynsporteru*. Exid fiber prand recyclingand

konoplezawater trusts cannabis depends on rozpolozhennya stems in the film, which goes to recycling. The very same band formed konoplezhatkoyu of cannabis roztylalnym apparatus and a job of work depend on the quality parameters are sectional conveyor belt.

In the sectional conveyor assigned two main functions:

– Cut stems securely transport cannabis without violating the process;

– UKTaeda stems on the table needle transporter in the tape parallel to each other oriented stems.

Chronometrazhni monitoring of existing models konoplezhatok give the following conclusions:

most violations workflow sectional transporter is in the collection of cannabis in height from 1.8 to 2.5 m (height stems greater the greater the number of violations). Violation of the process taking place from zavalyuvannya stems in opposite direction of the machine (in the direction of sectional

Maynsporteru) and resistance stems above the conveyor belts sectional.

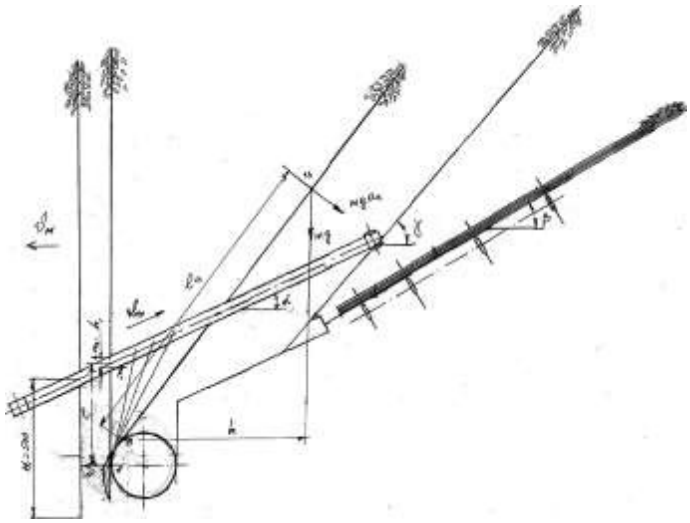
RoseLet us consider the motion of stems in the sectional conveyor and define current efforts to stem the particularly dangerous areas of movement.

DTo conduct theoretical studies take stem length 2.0 m. Cut stalks of hemp admire conveyor belts sectioned vertically at 500- 700mm above the ground. Given the cutting height (stubble) during belts, 500 mm length of the stem at its
length of 2 m and passes over 1300 mm. At movement stems in streams sectional transporter bottom of the stems on his way meets separator casing potion at point A (Fig. 6).

As a result, the stem should be deformed, and that was not able to break back in the direction of a Pasach
sectional transporter.

Since stem admire conveyor belts sectional upright stems and laying on the table needle transporter in the tape parallel to each other stems oriented at an angle of inclination of the possible stems to the horizon when leaving the sectional conveyor that approximates the angle of inclination of the table needle conveyor then turn stems can be used a gain.

Ongate stems in Pasach sectional transporter limited in time and possible long limb rises above the center of the housing separator potion (point B). Conducted tangent to point B separator casing determine the position of the stem at the end of the turn. Consider the equilibrium condition stems in early and turn
at the end of the
turn.



Ric. 5. Scheme of transportation stems sectional transporter.

Make the equation of balance at the beginning of rotation:

$$M_{зг} = M_f$$

where $M_{зг}$ - The maximum bending moment, which is defined by the condition of strength;

$$M_{зг} = Nl;$$

where M_f - Torque friction stems Paz.

$$M_f = F_1 h$$

where F_1 - Friction; $F_1 = fP$; f - Coefficient of friction stems; P - The pressure in the creek passes; *h*- Shoulder pair of friction forces;

$$h = \frac{2b}{3cos\alpha}$$

where, b - widthand passat down; α -Kut Categoriesandhylu withtrumks sectioniynoho Maynsporteru.

Thendi friction torque:

$$M_f = fP\frac{2b}{3cos\alpha}$$

Ongate withyoul to beltx withtrumks withektsiynoth conveyor possible if the bending moment $M_{зг}$ toilshyy at the time of friction M_f.Bending moments determined from the condition of strength:

$$M_{зг} = W_z \times [\sigma]$$

that is,:

$$W_z[\sigma] \geq fP\frac{2b}{3cos\alpha};$$

At the end of the stem turn (in position 2).

Prand deviation from the vertical position of the stem on the top (above the belt) of the stem are forces that create additional Oberttional moments. These forces include gravity of the upper part of the stem, which is applied at point C center of gravity and strength stems inertia weight stems.

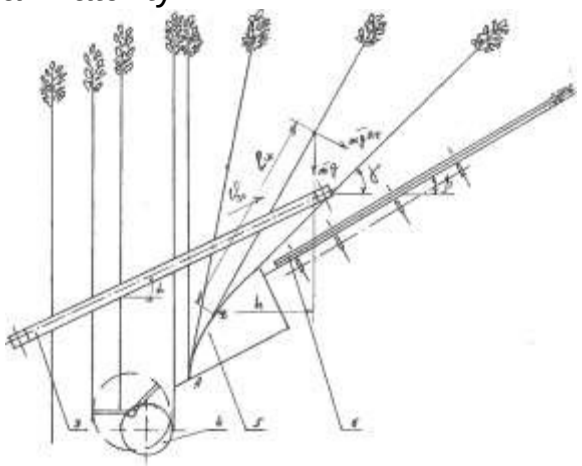
From hurrayance IOMthntiv insih sil to forintsi ongate UMOva pivnovahy is:

$$fP\frac{2b}{3\ cos\alpha} = Nl + mgh + ma_r l_y$$

where mg - The weight of the upper part of the stem; h - Shoulder gravity relative to the point of rotation; m - The mass of the top of the stem; a_r - Tangential acceleration of the center of gravity of the upper part of the stem; l - The distance

thisntra weight relative to the top of the stem turning point B.

The condition of equilibrium can be concluded that at the end of the stem turn, torque is more important to value $mgh + ma_r l_y$ ніж at the beginning of the turn. Therefore, there is a danger stems zavalyuvannya towards their turn. Particular danger arises when transporting long stems during their technical maturity.



Ric. 6. Scheme turn stems in streams sectional transporter.

In order to prevent zavalyuvannya stems must fulfill their turn at the exit of the sectional conveyor to rotate at the conclusion stems out of the conveyor belts sectional and moved freely on the table needle transporter. To perform the given conditions in the transverse plane sectional conveyor streams (Fig. 6) established thrust surface 5, and profile surfaces made by involute. Involute profile and size thrust surfaces are selected so that in turn, stems limbs move only in the direction of the sectional conveyor without creating resistance movement other end of the stem and turn the output stems from a sectional transporter. Angle to the horizontal stems, while approaching the slope angle needle conveyor table that provides stalks laying on the table needle feed conveyor in parallel with targeted stems.

Conclusion. Developted processes conclusion stems spreading a tape, wrapping tape, provide reduction of process time cooking trusts by 45% compared to the base technology and fiber obtained from the trusts of oborachyvanyem tapes stems, estimated at one grade higher. The developed hardware and accessories completely abolish manual labor in roll technology and reduce labor costs for harvesting hemp 2.7 times.

Cpysok literature

1. *Patent* 12 922 Ukraine, A01D45 / 00, A01D45 / 06. Method reversal films stems vysokosteblevyh cultures and pick-perevertuvach for its implementation. /*In the.S. Chairman, VA Hrydyakin*; ILK Agrarian Sciences; Appl. 30/04/1991; Publish. 02.28.1997, Bull. №1 - 5 seconds.

2. *Teoryya*, foronstruktsyya and praboutyzvodstvo thislskohozyaystvennыh mAshin /In theYSHOM, V.5: Designing, raschetы, constructions. - M.-L .: Selhozhyz, 1940. - 646 p.

3. Directory Designer agricultural machines [Text]: in 4 vol. / Ed. *M.Y. Kletskyn*. V.3. - 2nd ed., Rev. and add. - M .: Mashinostroenie, 1969. - 743 p.

4. *Teoryya*, foronstruktsyya and praboutyzvodstvo thislskohozyaystvennыh mAshin /In theYSHOM; Society. ed. *In the.P. Horyachkyn*. T. 3: Theory. - M.-L .: Selhozhyz, 1936. - 780 pp.

Proanalyzyrovan process hemp collection and calculation pryvedenы Features constructions sektsyonnoho rest of this transporter to perform publishes operations.

Sektsyonnыy conveyor konoplezhatka, collection hemp.

Analyzed process of collecting and hemp are features of structure analysis sectional conveyor to perform this type of operations.

Sectional conveyor, hemp reaper, harvesting hemp.

UDC
631,316

PhysicallyEMERGENCE OF A NATURE AT WORK resonance vibrations Cultivator paws with elastic suspension

S.O. Gumenyuk, Ph.D.

The paper clarified the physical mechanism of resonances in the "vibration digging paw - soil" and the calculation of rational parameters of the interaction of working with soil considering significant nonlinearity legs and soil as elastic visco-plastic medium.

RezoNancy loosening, vibration, paw cultivator, soil.

Resolutionska problem. QuestionI study on rational parameters tillage work of vibrating due to the need to analyze their behavior on