IIUM Engineering Journal • Volume 26, Issue 2, Pages 220 - 229 • 2025

Document type
Article

Source type
Journal

ISSN
1511788X

DOI
10.31436/iiumej.v26i2.3518

View more

THEORETICAL STUDY OF ELLIPTIC DRUM OF VERTICAL SPINDLE COTTON PICKER

Ravutov, Shavkat[a]; Rakhimov, Abdumalik[b] ; Ibragimov, Gafurjan[c]
Save all to author list

[a] Machine building, Tashkent State Technical University, Tashkent, Uzbekistan
[b] Department of Science in Engineering. International Islamic University Malaysia, Malaysia
[c] Dynamical systems and their applications, V.I. Romanovskiy Institute of Mathematics, Uzbekistan Academy of Sciences, Tashkent, Uzbekistan
[d] Department of Econometrics, Tashkent State University of Economics, Tashkent, Uzbekistan
View additional affiliations

Abstract

The article focuses on the structural optimization of the planetary mechanism of the spindle drum of a vertical-spindle cotton-picking machine in Uzbekistan and discusses the problems of synthesizing a new vertical-spindle drum that significantly enhances the efficiency of using spindles and increases the productivity of the machine. Utilizing the interaction characteristics of drum spindles with cotton plants and ensuring the effective functioning of spindle friction drives, it is theoretically justified that the trajectory of spindle relative motion has an elliptical shape. Special attention is given to the shape and dimensions of the directional path, ensuring the elliptical movement of the spindles. An analytical expression is obtained, and a convenient calculation algorithm is developed to automate the investigation of the influence of the dimensions of drum mechanism parts on the directional path shape and its dimensions. The theoretical results allow for preliminary conclusions regarding the dynamic processes occurring during drum operation and provide recommendations for selecting the directional path shape and dimensions.

Author keywords

Cotton picker; directional path; planetary mechanism; vertical spindle

SciVal Topics

References (14)

View in search results format >

All

Export Print E-mail Save to PDF Create bibliography

1 Khurramov, S.R., Abdukarimov, A., Khalturaev, F.S., Kurbanova, F.Z.

Modeling of friction forces in an asymmetric two-roll module (Open Access)

(2020) *IOP Conference Series: Materials Science and Engineering*, 916 (1), art. no. 012051. Cited 24 times.
https://iopscience.iop.org/journal/1757-899X
doi: 10.1088/1757-899X/916/1/012051

View at Publisher

2 Bahadirov, G.A., Sultanov, T.Z., Abdukarimov, A.

Kinematic analysis of tooth-lever differential transmission mechanisms

(2020) *IOP Conference Series: Earth and Environmental Science*, 614 (1), art. no. 012101. Cited 17 times.
https://iopscience.iop.org/journal/1755-1315
doi: 10.1088/1755-1315/614/1/012101

View at Publisher

3 Bahadirov, G.A., Sultanov, T.Z., Abdukarimov, A.

Kinematic analysis of tooth-lever differential transmission mechanisms

(2020) *IOP Conference Series: Earth and Environmental Science*, 614 (1), art. no. 012101. Cited 17 times.
https://iopscience.iop.org/journal/1755-1315
doi: 10.1088/1755-1315/614/1/012101

View at Publisher

4 Khurramov, S.R., Abdukarimov, A., Khalturaev, F.S., Kurbanova, F.Z.

Modeling the Shape of the Roll Contact Curves in Two-Roll Modules

(2021) *Journal of Physics: Conference Series*, 1789 (1), art. no. 012008. Cited 23 times.
http://iopscience.iop.org/journal/1742-6596
doi: 10.1088/1742-6596/1789/1/012008

View at Publisher

5 Turanov, K., Abdazimov, A., Shaumarova, M., Siddikov, S.

Type analysis of a multiloop coulisse mechanism of a cotton harvester

(2021) *Advances in Intelligent Systems and Computing*, 1258 AISC, pp. 290-305. Cited 8 times.
http://www.springer.com/series/11156
ISBN: 978-303057449-9
doi: 10.1007/978-3-030-57450-5_27

View at Publisher

6 Turanov, K., Abdazimov, A., Shaumarova, M., Siddikov, S.

Mathematical modeling of a multiloop coulisse mechanism of a vertical spindle cotton harvester (Open Access)

(2021) *Advances in Intelligent Systems and Computing*, 1258 AISC, pp. 306-321. Cited 4 times.
http://www.springer.com/series/11156
ISBN: 978-303057449-9
doi: 10.1007/978-3-030-57450-5_28

View at Publisher

7 Uljayev, E., Ravutov, S.T., Ubaydullayev, U.M.

Remote control device to control the contact uniformity of the brush strippers on the spindle's surface of the cotton picking apparatus (Open Access)

(2020) *IOP Conference Series: Earth and Environmental Science*, 614 (1), art. no. 012139. Cited 8 times.
https://iopscience.iop.org/journal/1755-1315
doi: 10.1088/1755-1315/614/1/012139

View at Publisher

8 Amanov, A., Sembiring, J.P.B.A., Amanov, T.

Experimental investigation on friction and wear behavior of the vertical spindle and V-belt of a cotton picker

(2019) *Materials*, 12 (5), art. no. 773. Cited 14 times.
https://www.mdpi.com/1996-1944/12/5/773/pdf
doi: 10.3390/ma12050773

View at Publisher

9 Bahadirov, G., Ravutov, S., Abdukarimov, A., Toshmatov, E.

Development of the methods of kinematic analysis of elliptic drum of vertical-spindle cotton harvester (Open Access)

(2021) *IOP Conference Series: Materials Science and Engineering*, 1030 (1), art. no. 012160. Cited 21 times.
https://iopscience.iop.org/journal/1757-899X
doi: 10.1088/1757-899X/1030/1/012160

View at Publisher