

AP14869550 “Developing and studying the design of a stationary elevator for loading grain cargo into containers transported by railway platforms” – p.m. Balabayev O.T.

Relevance:

At present, at agricultural elevators, loading of grain cargo into containers transported by road is performed by mobile elevators. On rail transport that is the main type of transport for the export of Kazakhstan grain crops, the loading of grain cargo is performed through elevator bunkers into grain wagons. In Kazakhstan, the number of grain wagons is limited due to their high cost and the harvest seasonality. The main idea of the project is that the developed design of a stationary elevator will allow loading grain cargo through elevator bunkers into containers transported by railway platforms. Implementation of this project will significantly increase the possibilities of exporting Kazakhstan grain crops by rail.

The project purpose:

Developing a design and studying the operation of a stationary elevator for loading grain cargo into containers transported by railway platforms for further implementation in agricultural production of grain crops.

Expected and achieved results:

When conducting studies to obtain the expected results in the project, scientific and technical work will be carried out in the following sequence:

- theoretical studying of the stationary elevator operation, including patent search, mathematical research methods;

- experimental studying of the stationary elevator operation in the software environment of the ANSYS application program, including methods of planning and processing experiments;

- implementation of theoretical and experimental studies: developing the design and technical documentation based on the completed theoretical and experimental studies.

The main results of the work will be presented in the form of:

- 2 articles in peer-reviewed scientific publications included in the 1st (first) and (or) 2nd (second) quartile by impact factor in the Web of Science database and (or) having a CiteScore percentile in the Scopus database of at least 65 (sixty-five);

- 2 articles in peer-reviewed scientific publications recommended by the CQASHE;

- a monograph in a foreign publishing house;

- a monograph in a Kazakhstan publishing house;

- a patent in the Kazakhstan patent office;

- a certificate of state registration of rights to a copyright object in the Kazakhstan patent office;

- a license agreement for scientific and technical products (design documentation for development);

- an experimental methodology in the ANSYS application software environment;

- a set of design documentation in the AutoCAD application software environment.

Information of the work performed and the results achieved in the first half of 2024.

1. The work is underway to develop design and technical documentation for the assembly of a pilot model of a stationary elevator software in the AutoCAD application environment: elements of horizontal beams of the load-gripping frame; elements of vertical beams of the load-gripping frame; elements of diagonal beams of the load-gripping frame; elements of connecting units of the load-gripping frame.

2. A patent of the Republic of Kazakhstan was received for the developed design of a stationary elevator: a patent for utility model No. 8971 dated 10/01/2024.

3. A monograph was published in a Kazakhstan publishing house, as well as a monograph in a foreign publishing house.



Figure 1 – Research team in the work process

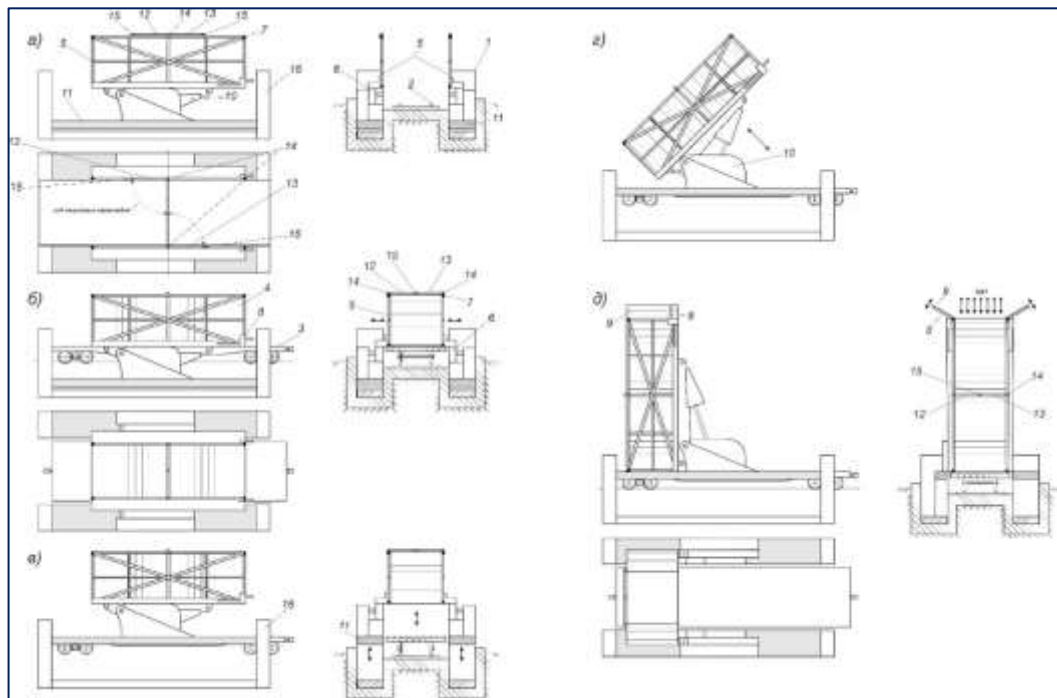


Figure 2 – Diagram of the developed stationary elevator in the software environment of the AutoCAD application program

List of publications:

1. Balabayev O.T., Kasymzhanova A.D., Ibatov M.K., Rozhkov A.V. Definition of the main equipment for the hydraulic system of a stationary hoist // Proceedings of the University. - Karaganda: KarTU im. A.Saginov, 2022. No. 4 (89). P. 266-273.

2. Kassymzhanova, A.D., Ibatov, M.K., Balabayev O.T., Donenbayev, B.S., Ilessaliyev, D.I. Experimental study of maximum stresses in the stationary hoist design in the Ansys software environment. Communications - Scientific Letters of the University of Žilina, 2022, 24 (4), pp. B310–B318.

3. Balabayev O.T., Ibatov M.K., Mikhailov V.F., Kassymzhanova A.D., Askarov B.Sh. Determination of static stresses in the design of the load-gripping frame of a stationary elevator. University Proceedings. Karaganda: KTU named after A.Saginov, 2023. No. 3 (92). P. 251-257.

4. Balabayev O.T., Askarov B.Sh., Kassymzhanova A.D., Beisembayev D.M., Kanat F.E., Atken E., Makhasheva I.S., Mikhailov V.F. Work of science. Experimental methodology for the design of a stationary elevator for loading grain cargo into containers transported by railway platforms in the software environment of an application program. Certificate of state registration of rights to a copyright object. No. 33603 dated March 15, 2023.

5. Balabayev O.T., Kassymzhanova A.D., Askarov B.Sh., Mikhailov V.F., Beisembayev D.M., Kanat F.E., Atken E., Makhasheva I.S. Method of loading bulk cargo into containers transported by railway platforms. Patent for utility model No. 8971. Registered in the State Register of Inventions of the Republic of Kazakhstan on January 10, 2024.

6. Kassymzhanova A.D. Developing and studying the design of an elevator for loading bulk cargo into containers: Monograph. Karaganda: Publishing house of KTU named after A. Saginov, 2024. 116 p.

7. Balabayev O.T., Kassymzhanova A.D., Suyunbaev Sh.M., Askarov B.Sh., Mikhailov V.F. Developing and studying the design of a stationary elevator for loading grain cargo into containers on railway platforms: Monograph. Tashkent (Tashkent State Transport University, Uzbekistan): Publishing house of OOO "OMADBEK PRINT NUMBER ONE", 2024. 106 p.

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Information for potential consumers:

The analysis of grain exports in the agricultural sector of Kazakhstan has shown that the practical significance of the project is beyond doubt, since the main possible effect of the introduction of a stationary elevator for loading grain cargo into containers transported by railway platforms in agricultural production (elevators) is an increase in the export of grain crops by rail with a shortage of grain wagons during the work season. Readiness for commercialization of the expected results of this project will be confirmed by a license agreement with the private partner. With the availability of project funding, the risks are minimized.

Scope:

The target consumers of the obtained results of the project can be elevators of agricultural production facilities that export grain crops. When implementing the project, a breakthrough result is possible, which will significantly affect the development of science and technology in the field of application of lifting and transport equipment in rail transport.

Information update date: 05.07.2024.