

Development of a mechanized moving platform for human service

Bohdan Fedyshyn, assist. Construction Machinery dep. ¹ (ORCID: 0000-0003-2420-7332),
Serhiy Bilokon, Phd stud. ¹ (ORCID: 0009-0008-4311-926X)

¹ *Kyiv National University of Civil Engineering and Architecture, 31 Air Force Avenue, Kyiv, 03037, Ukraine*

ABSTRACT

The purpose of the article is the development of a mechanized mobile platform for serving people, which is caused by the need to increase the safety of the operation of such technical means, in particular, in the case of the need for mass customer service. The methodology is based on search, research and creative approaches. The methods of development analysis, patent search. Research results. The article solves important safety issues of human service, in particular in the entertainment industry through the development of structural parts, drives and rules for the operation of mechanized moving platforms.

Keywords: human service, operational safety, sustainability.

1. INTRODUCTION

The development of mechanized equipment for serving people is highly relevant in the sector of organizing cultural and mass events. Thus, during the organization of concerts of world stars, moving platforms are used, which aim to create spectacle and captivate the audience.

2. MATERIALS AND METHODS

Today, effective methods of analysing technical solutions are patent search [1], expert evaluation. The analysis of patent decisions, in particular, allows, in addition to determining the level of technical developments, to conduct an analysis of the economic feasibility of scientific developments and development trends through the study of the dynamics of patenting, geographical affiliation, calendar frequency, affiliation to the applicant.

3. RESULTS AND DISCUSSION

Works [2] are devoted to the study of rational approaches to the design of technical means.

The authors determined that the main directions of effective design and construction of complex systems can be formed as the total indicators of their components, their optimal joint functioning.

It was also noted that increasing the safety of operation of mechanized means can be solved by effective design of mechanized means, reducing their material capacity, ensuring the smoothness of movement modes of mechanisms, increasing their stability, improving the ergonomics of the entire structure and its components [3].

There are well-known solutions for the moving platform-cabin of the driver of a single-bucket excavator [4].

In this solution, the visibility of the operator increases, which is effectively reflected in the safety indicators of technological operations during the work of the excavator driver.

Mechanized moving platforms intended for serving people also include travelators, escalators, lifting platforms for people with disabilities, etc. [4 - 8].

The main problem during the operation of such mechanized systems is the need for smooth movement modes, which include starting, moving and stopping.

To ensure the smoothness of movement of mechanized moving platforms, as a rule, electric control systems of smoothness of movement are used. In addition, the maximum values of the movement speed of such systems are determined - 1 m/s.

In order to effectively analyse technical solutions aimed at increasing the safety of operation of mechanized moving platforms, we will conduct a patent study.

To search for technical solutions in the database systems of patent solutions, we will define thematic search directions (Table 1).

Using the sources of patent documentation, they conducted a search and analysis of technical solutions to the problem. Based on the search results, determine the relevance of this problem.

Table 1: Search regulation

Search subject	Classes according to the IPC	References
Counterweights	E02F 9/18	«Google Patents»: patents.google.com
Flywheels characterized by means for changing the moment of inertia	F16F15/31	«Espacenet»: espacenet.com «База патентів України»: uapatents.com
Lifting devices; Safety devices	E04G3/32	

Analytical research of technical solutions for mechanized platform was conducted on the basis of a patent search for the period from 2000 to 2023.

To search for patent documentation, information sources from the global Internet were used: "Google Patents" (patents.google.com), "Espacenet" (espacenet.com), "Patent Database of Ukraine" (uapatents.com).

According to the international patent classification, the necessary documentation falls into the class E02F 9/18, B66B 9/08, F16F15/31, E04G3/32 (fig.1-3).

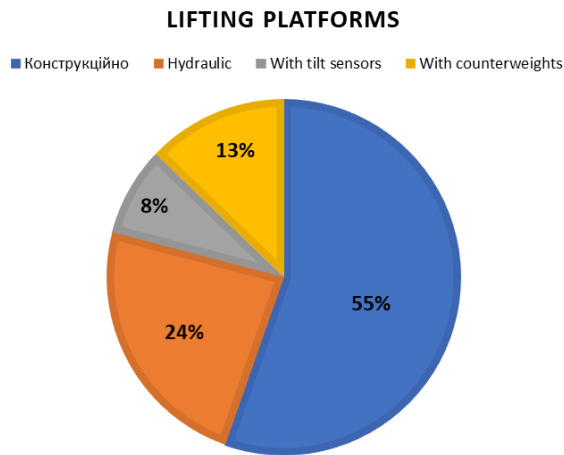


Figure 1. Result of searching by “lifting platform”

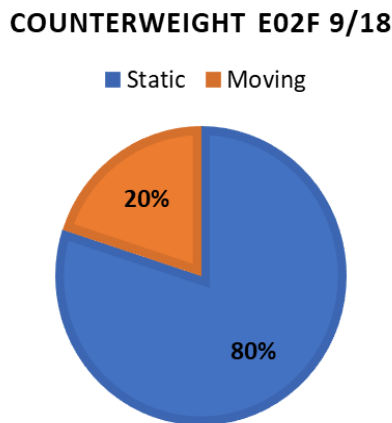


Figure 2. Result of searching by “counterweight”

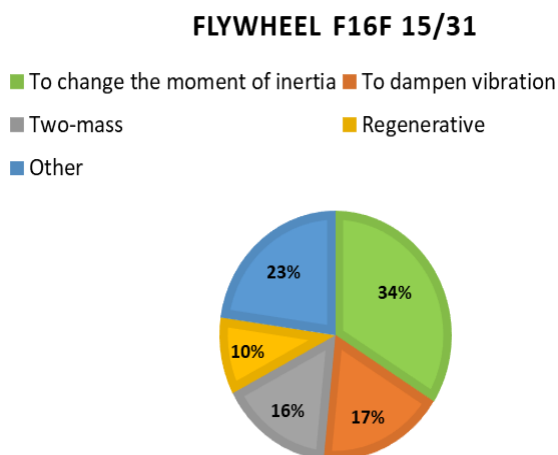


Figure 3. Result of searching by “flywheel”

After analyzing the distribution of patenting activity, it is possible to determine the development trends of the direction and develop a strategy for the construction of elements of the serving peoples platform.

4. CONCLUSIONS

The development of mobile platforms for serving people is an actual direction that solves the needs of people in various directions, in particular, the organization of cultural and mass events. At the same time, solving the problems of the mechanization of such platforms is a broad direction that requires patent research, taking into account specific safety standards of structures and operation, synthesis of technical solutions and modelling of the behaviour of structures.

References

- [1] DSTU 3575-97. Patent studies. Basic provisions and procedure of implementation. 1997.
- [2] Sukach M. K., Ryzhakova L. M., Chernyshev D. O., Ivakhnenko I. S. Fundamentals of technology transfer: a textbook. 2020. 318 p.
- [3] Garnets V., Shalenko V., Maslyuk A. Methodology of creating machines. Practical work and tasks for the course work: teaching manual. 2018. 100 p.
- [4] Advisor on creating an accessible environment for persons with disabilities and other groups with reduced mobility., with the support of the Government Commissioner for the Rights of Persons with Disabilities URL: [https://podil.kyivcity.gov.ua/files/2023/4/5/ Poradnyk inv.pdf](https://podil.kyivcity.gov.ua/files/2023/4/5/ Poradnyk_inv.pdf), Kyiv. 2023.
- [5] DBN V.2.2-17:2006 "Buildings and structures. Accessibility of buildings and structures for groups of the population with reduced mobility".
- [6] Rules for the construction and safe operation of amusement equipment, approved by the order of the Ministry of Ukraine for Emergency Situations and for the Protection of the Population from the Consequences of the Chernobyl Disaster dated March 1, 2006. No. 110.
- [7] Construction of adapted playgrounds for disabled children: website. URL: https://rope-park.com/our_services/budivnytstvo-inkliuzyvnykh-dytiachykh-majdanchykv/.
- [8] Requirements for the safe operation of attractions: clarification by the State Labor Office. URL: <https://oppb.com.ua/news/vymogy-do-bezpechnoyi-eksploatatsiyi-atraktsioniv-roz-yasnennya-derzhpratsi>.