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## Technological approach to environmental greening of large cities

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# Technological approach to environmental greening of large cities

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**Abstract.** The relevance of this article is due to the fact that the improvement and greening of large cities is the most important sphere of activity of the municipal economy. It is in this area that the conditions are created for the population, which provides a high standard of living. Thus, conditions are created for a healthy, comfortable, comfortable life for an individual at the place of residence, and for a larger mass of residents of the city, district, quarter, micro district. When carrying out a set of measures, they can significantly improve the environmental condition and appearance of cities and towns; create more comfortable microclimatic, sanitary and aesthetic conditions on the streets, in residential apartments, public places (parks, boulevards, squares, etc.). The implementation of the project proposed in the article will allow the self-government bodies and housing and communal services to improve the efficiency of works on urban greening, to provide an opportunity for agricultural organizations and horticultural farms to carry out work on tree transplanting and land cultivation using an accessible (mobile) unit.

## 1. Introduction

Modern human habitat with a high level of technical, technological, transport and energy equipment is the main source of pollution and degradation of urban areas, containing mutagenic and carcinogenic substances, highly toxic components and products of radioactive contamination. This is largely due to the violation of environmental safety of residence, increased morbidity and mortality in critical areas of large cities [1-3].

For large industrial cities at the present stage, one of the most important factors in creating favorable conditions for the life of the population is the presence of natural or artificial natural objects, which, unfortunately, is associated with significant costs of work. In this regard, improving the environmental and economic efficiency of the various elements of urban landscaping in a limited area is relevant for any industrial and industrial settlement.

## 2. Experimental

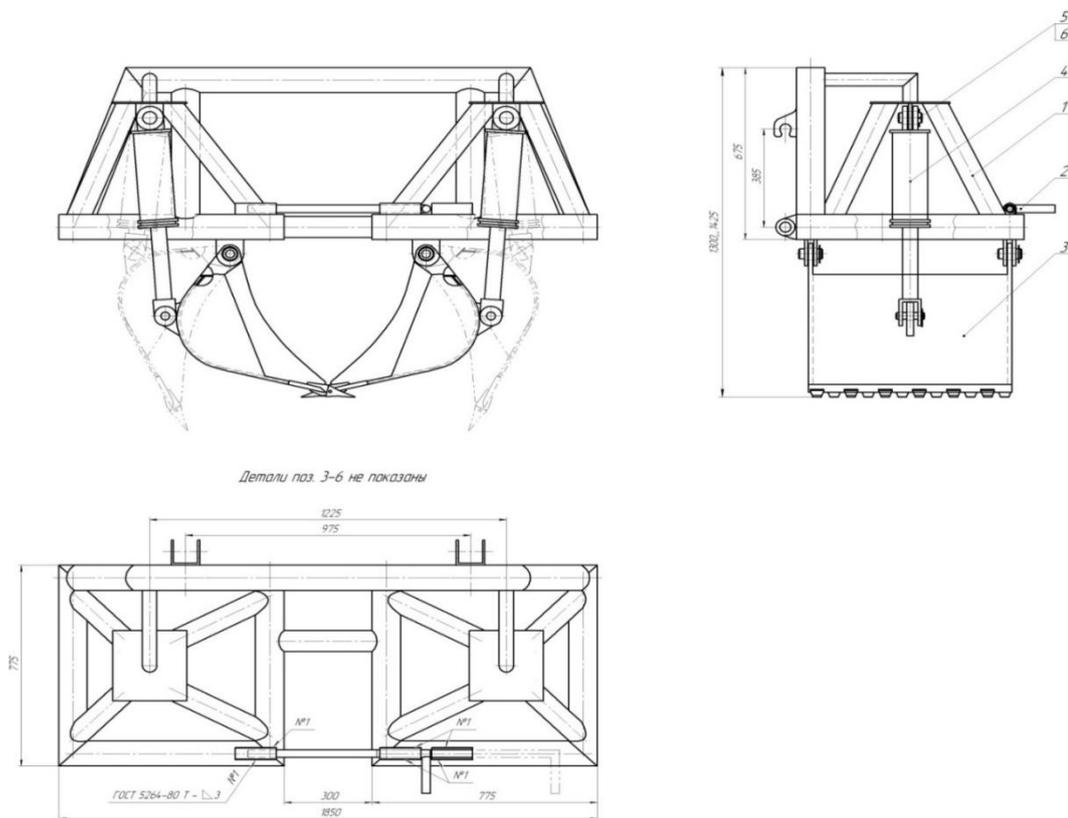
The article deals with the problem of optimization of the environment of large cities by methods and means of landscaping of various functional purposes [4-5]. The established methods and traditions in urban greening, the principles of their formation, as well as the regulatory and technical base of design do not provide the minimum environmental comfort of the functional areas that are most vulnerable in environmental terms [6-7]. The proposed technical solutions for the creation of a device for transplanting trees and shrubs both within the boundaries of large cities and beyond are basic because their



implementation objectively ensures the development of related areas, such as the cultivation of soils for various agricultural purposes, etc. [8].

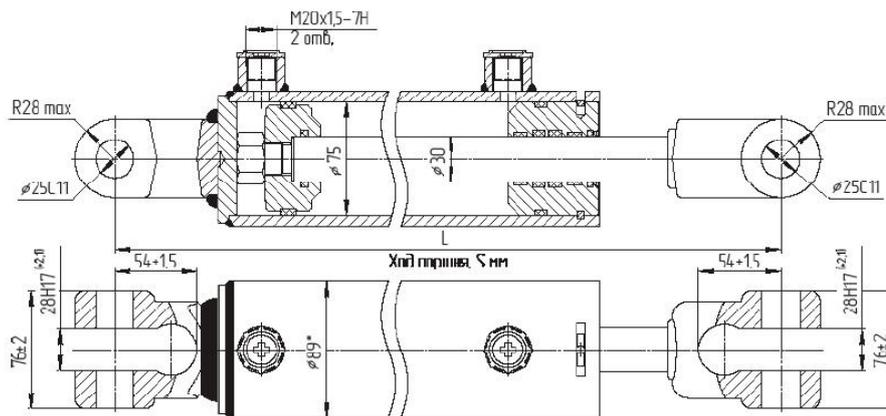
The purpose of this paper is the design and technological refinement of the previously created, but not tested, device transplant of trees for greening the inner city area (including those with restricted access), culture technical carrying out of works on restoration of agricultural lands etc. The device will allow:

- to carry out a complex of works on optimization of natural environment of large cities, and also artificial reproduction of landscapes by methods and means of gardening of territories of various functional purpose;
- to make improvement of the environment capable to create comfortable living conditions of the population of the city;
- enrich the landscape of the village, increasing the attractiveness and picturesqueness;
- culture technical to carry out work on the facilities associated with the construction and establishment of new farms, using mostly drained and irrigated lands, which aim at solving the target integrated programmes for specific regions region or district;
- ensuring a large (optimal) field handling and planting when carrying out works on drainage and irrigation;
- creation of large contours of agricultural land (arable land, hay), providing high-performance use of agricultural machinery and tools, etc.



**Figure 1.** Device for transplanting trees: Where: 1-frame; 2-locking device; 3-bucket; 4-cylinder; 5-pin (8 pcs.); 6 - pin (16 pcs.).

- to ensure the functionality of the device, the article proposes to make the following changes to the design:
- change the design of the bucket, which will become more like a bucket for rocks, not for loose soil;
- add teeth to fix the bucket and more effective grip;
- change the angle of entry of the bucket into the ground;
- slightly increase the lifting height due to the change in the bucket angle (figure 1).



**Figure 2.** Hydraulic cylinder, driving exciting buckets.

The principle of operation of the device is quite simple-counter shovels, driven by two hydraulic cylinders mounted on the frame undermine the root mass together with the mass of the root soil, the maximum diameter of the trunk is 150 mm.

The buckets themselves will be driven by two hydraulic cylinders, which are shown in the figure (figure 2 band 3 s).

### 3. Results and considerations

In the analysis of the main technical and economic indicators of the device for transplanting the woodland were identified its advantages:

- low cost of manufacture;
- aggregation with tractors of domestic production (figure 3 band 3 s);
- use both for digging trees and holes for planting with loading soil into the trailer;
- the device can be used in small areas with a low amount of work.

During the tests before the proposed changes were identified shortcomings:

- high resistance at the entrance to the ground;
- hangingexclusivelyonPKU-08.



**Figure 3.** Aggregation device for transplanting small trees with a tractor.

During the tests, it was also found that due to the small angle of entry of the buckets into the soil and their shape, as well as the low pressure capacity of the device, its use is ineffective, therefore, the solutions proposed in the article will be very significant.

#### 4. Conclusion

The development of this device will contribute to the creation of favorable living conditions of the population through the arrangement of natural or artificial natural objects with a minimum cost and high work efficiency. Consequently, the achievement of environmental and economic efficiency in the course of greening large cities in a limited area through the implementation of the project will move from the problem to the category of daily tasks.

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