

A Review of Artificial Waterfalls in Gardens

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Abstract: When artificial waterfalls are built in gardens, leaves from trees or vegetation often fall into the water storage pool and block the pipelines, requiring regular cleaning of pipelines. This not only increases the manpower needed for maintenance but also disrupts the use of the waterfalls. Therefore, it is necessary to design a new type of artificial waterfall that is suitable for gardens. The waterfall should incorporate features that make cleaning easier, including filter plates and water funnels to prevent clogging caused by fallen leaves and debris.

Keywords: Intelligence; Efficiency improvement; Transportation pipeline; Technical artificial waterfall

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1. Introduction

Gardens refer to specially cultivated natural landscapes and recreational areas. Gardens are divided into two categories: royal and private gardens, both renowned for their unique styles^[1]. Within a defined geographical area, engineering technology, and artistic techniques, such as terrain manipulation (including mountain construction, stone stacking, and water management), diverse planting of trees and flowers, construction of buildings, and establishment of walkways are employed to craft a picturesque natural environment. Such recreational spaces are commonly referred to as gardens^[2].

As the demand for a better quality of life increases, garden landscape construction has become an important part of urban construction. Therefore, it is essential to design and build excellent landscapes. Traditional garden architecture plays a unique role in traditional Chinese architecture. However, for gardens with artificial waterfalls, leaves from trees or plants often fall into the water storage tank, causing pipeline blockage. Therefore, the pipelines will need to be cleaned regularly, causing much inconvenience for the staff^[3].

2. Status of artificial waterfalls

Artificial waterfalls serve as distinctive landscape features, enhancing the natural beauty and aesthetic appeal of gardens, parks, commercial properties, and various other settings. Their presence captivates attention and generates interest. With the rising societal inclination towards leisure, entertainment, and environmental consciousness, the demand for artificial waterfalls is steadily increasing, leading to continuous growth in the

market for such installations. Urbanization, while progressing rapidly, has resulted in diminishing public and private spaces within cities, intensifying people's desire for natural beauty. Consequently, artificial waterfalls have garnered significant market interest as they offer a means to cultivate natural beauty within constrained urban environments ^[4].

The continuous development of science and technology has led to the evolution of artificial waterfall design and manufacture, making the visual effects of waterfalls more realistic and diverse ^[5]. Besides, the emergence of new materials opened up more possibilities in artificial waterfall construction. The development of artificial waterfalls is also largely affected by environmental awareness. With an increasing demand for environmental friendliness and sustainability, more emphasis has been placed on energy saving, emission reduction, and rational use of water resources in waterfall design and construction ^[6]. Designing a new type of artificial waterfall is one of the solutions to the problems associated with artificial waterfall utilization.

3. Market prospects

Artificial waterfalls can provide visual and auditory pleasure, making them popular spots among tourists. As the demand for tourism and leisure activities rises, so does the popularity of artificial waterfalls. Secondly, with the continuous acceleration of urbanization, green spaces and landscapes within cities have become increasingly important. Artificial waterfalls play a crucial role in enhancing the aesthetic appeal and greenery of urban areas, including parks, squares, and communities. Their presence contributes to the overall comfort and satisfaction of city dwellers. Thirdly, artificial waterfalls provide fresh air and a soothing environment, which contribute to improving one's physical and mental health ^[7]. With the growing consciousness surrounding health and environmental preservation, there is a parallel increase in demand for landscape architecture that offers both natural environments and health benefits. Moreover, ongoing technological advancements have led to a gradual reduction in the production and maintenance costs associated with artificial waterfalls. This reduction in costs opens up new possibilities in design and effects. This will attract more designers and developers to adopt artificial waterfalls as part of their landscape architecture, further promoting market development. While artificial waterfalls hold great promise, the competitive market demands that manufacturers and designers continuously innovate and improve product quality to meet customer needs. Besides, the construction of the waterfalls should align with the principles of environmental friendliness and sustainable development.

4. Project features

To fulfill the demand for a better quality of life, a novel type of artificial waterfall was designed. This type of artificial waterfall offers several advantages.

The project is divided into multiple horizontal and vertical sections to minimize the impact of the water flow, allowing visitors to better appreciate the waterfall's beauty. The design incorporates sloping surfaces, guiding rainwater to cascade down from the slope and slide to the ground. At the same time, to prevent rainwater from entering the storage tank, a filter is installed at the water outlet. The pump is designed in a way that allows the recycling of the water in the storage tank, which greatly reduces the workload of the staff. Furthermore, filter plates and filters are installed to prevent debris from entering the storage tank. This feature helps prevent water accumulation in the reservoir. Additionally, a leak-proof plate, adjustable by a spring mechanism, is installed at the reservoir's bottom to effectively prevent clogging. The protective cage is assembled in the tank using a four-part process, facilitating easy disassembly and cleaning for workers.

5. Product description

(1) People-oriented

The pipelines of artificial waterfalls in gardens are often blocked because leaves and debris from the surrounding plants fall into the water storage pool, so the pool will have to be cleaned regularly, which is a problem ^[9]. Most storage pools in the market can only be cleaned manually, which is time-consuming, labor-intensive, and unsafe ^[10]. Therefore, we designed a new type of artificial waterfall that enables easy cleaning.

(2) Description of the new artificial waterfall

The artificial waterfall consists of a waterfall platform and a storage tank. Inside the storage tank, a delivery pipe is enclosed within a protective cage, which includes multiple connecting plates secured by waterproof bolts. These bolts are inserted into waterproof nuts fixed in a fixing plate. A cover plate is affixed to the upper end of the protective cage, connected to its side wall through screws. The fixing plate is positioned within the water tank and securely attached to its inner wall. The upper end of the protective cage is linked to a water conduit, with a gas pipe inserted into it. One end of the gas pipe connects to the water outlet of the water pump, while the other end connects to the water storage tank. The water pump is electrically connected to an external power supply via wires. Inside the tank, a baffle is installed, connected to an electric telescopic rod, which in turn is linked to a rope reel housing a wound rope. Grooves are incorporated into the waterfall platform, which houses the control systems.

6. Conclusion

The new type of artificial waterfall proposed in this paper has broad market prospects, especially in the tourism and entertainment industries. Artificial waterfalls improve the aesthetic appeal and greenery of scenic spots, parks, communities, etc., making city dwellers more comfortable and satisfied. As design and production technology for artificial waterfalls continues to evolve, costs are gradually decreasing, opening up more innovative possibilities. Through long-term analysis and research on the artificial waterfall market, our team has gained an understanding of people's landscape preferences. In response, we designed this intelligent, technological, and innovative landscape artificial waterfall to cater to these needs and enhance their quality of life. As society progresses, there is a growing emphasis on intelligence and humanity in people's lives, with a focus on practicality and innovation. Therefore, the design of a product has to be centered around people's needs, which also applies to designing artificial waterfalls.

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Disclosure statement

The authors declare no conflict of interest.

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