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Research on the Application of a New Type of Trash Can in the Renovation of Old Communities

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Abstract: With the development of urbanization in China, the dirty, chaotic and poor environment of old residential buildings from the 1970s and 1980s can not be ignored. This paper puts forward a new type of trash can, which is applied to the renovation of old communities: (1) Untimely garbage collection in old communities (2) Empty-nesters are inconvenient to go downstairs and throw rubbish again (3) Children are in danger at home because their parents go downstairs to throw rubbish (4) The deterioration of neighborhood relations caused by garbage stacking in corridors.

1. Introduction

According to the research chart of National Bureau of Statistics and Evergrande Research Institute, China's urban population will reach 1.02 billion in 2030 [1], which shows that its urbanization process is in a high-speed development stage, and it will be in high-speed development stage in the future. The acceleration of urbanization can alleviate the pressure of social employment. It is conducive to improving China's urban-rural dual structure and promoting the construction of a harmonious society. However, the ecological environment of Chinese cities includes solid waste environment, and the community environment and living environment are still in a state of partial improvement and overall deterioration. Our new trash can focuses on this, and is committed to improving the overall deterioration of the old community environment caused by urbanization. In order to make empty nesters free from the trouble of throwing garbage,we will strive to create a clean and comfortable community environment and living environment.

2. Research and Development Background of New Trash Cans

According to the data, the basic investment required by China's urban development is about 40 trillion to 45 trillion yuan, which is equivalent to an average investment of 800 billion to 900 billion yuan annually, and it is about one tenth of the total GDP in 2001. Only when the infrastructure is sound and perfect can the city take on the economic growth point of a new round of wealth gathering [2].

In order to ensure the universality and popularization of the project, our team chose Hongshan Factory family area, Warm Bay Community, Tianshui County, Tianshui City as the research objects. According to the investigation, Hongshan Testing Machine Factory was relocated from the northeast to Tianshui in 1966, followed by the construction of Hongshan Plant in 1968, which has

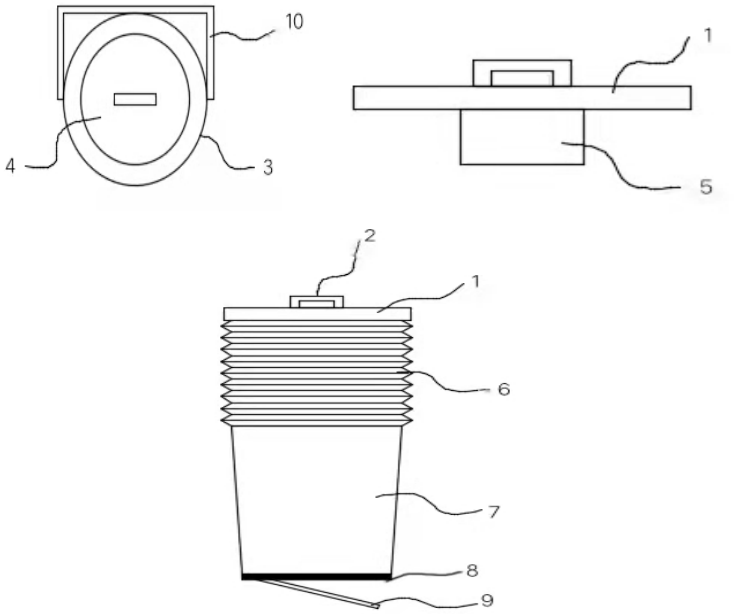
been 42 years since then. This building is planned as an old-fashioned residential building in Tianshui City, with backward infrastructure. According to the survey, 58.7% of the elderly said it was difficult to throw garbage downstairs and the housing was unsuitable for the elderly. Some 44.2% of parents said that their children were left unattended at home when they went downstairs to take out the rubbish. Our new trash can can effectively improve these situations, and the survey results are as follows :

1.The height of each floor of the residential building in this community is 3m, and the landing heights of windows on the first, second and third floors are 0.9m, 3.9m and 6.9m, respectively 2. There are two garbage spots in the family area of Hongshan Factory, Wenhe Wan Community, Tianshuijun Street, with an average daily garbage output of 2-2.5kg per household. The garbage truck is cleaned once a week. In terms of materials, we found out all kinds of materials for making trash cans in the market, compared their hardness and durability, cost and specifications, and made a detailed understanding of the power and price of the electromagnet used in the barrel cover. The elastic materials used in the project were carefully analyzed, and compared from the aspects of wiring strength, dispersion, formability, unit price and so on. Finally, the ideal materials were obtained.

3. The Structure of the New Trash Can

The new trash cans are able to be divided into four parts: the barrel, the flexibility, barrel body, the bottom. The lid uses the working principle of the electromagnetic sucker, and consists of a disc-shaped steel shell and an excitation coil in the shell. The excitation coil is a conductive winding whose power matches that of the iron core. The coil with current is magnetic like a magnet to absorb the magnetic conductivity barrel bottom. Our team plans to adopt the electromagnetic working principle, which relies on the coil to energize and absorb the materials, and the power-off magnetic discharge. Polyolefin elastomer (POE) is proposed to be used as the elastic expansion parts, which has the dual characteristics of plastic and rubber and excellent comprehensive performance. Compared with elastic materials such as EPDM, SBR and EVA, POE elastomer has the characteristics of low volume and low price, excellent heat resistance and cold resistance, wide range of application, good weather resistance and aging resistance. The barrel body is to be made of common durable trash can materials in the market, and the barrel-shaped structure with the largest capacity is used. The capacity of 62 liters can fully meet the needs of families.The bottom of the bucket is made of iron and equipped with valves to facilitate collection by garbage trucks. The rubber rim on the bottom of the bucket plays a buffering role and prolongs the life of the garbage can. The schematic diagram of the new trash can is shown in Figure 1.

The lid of the new trash can adopts the electromagnet model , namely, chFK-P50/27, which has a voltage of DC24V and a suction force of 55kg, and can completely meet the needs of collecting and storing trash cans. The elastic expansion part adopts POE, which has the characteristics of low price and small relative density.Low volume, light weight, and the elastic telescopic part is a hollow structure, having a large capacity and can accommodate more garbage. The barrel material of the new trash can is HDPE, which is a common PE material in the market, thus reducing the economic burden of the elderly in the community. The valve at the bottom of the bucket is made of iron and equipped with crash-proof rubber rings to reduce waste of garbage can.



1. Barrel Lid; 2. Handle; 3. Connection Part; 4. Cover Body; 5. Electromagnet Installation Shell; 6. Elastic Telescopic Parts; 7. Barrel Body; 8. Damping Rubber ring; 9. Valve; 10. Wall Mounting Parts.

Fig.1 Schematic Diagram of the New Trash Can

5. Operation Principle of the New Trash Can

In old communities, the new trash can will be installed outside the balcony on the second or third floor. When the elderly have finished cleaning garbage at home, they can come to the trash can on the balcony, open the lid and then pour the garbage.

With the increase of the weight of the dumped garbage, the elastic material will be deformed, and then the garbage can body is lowered as a whole until the amount of garbage reaches the maximum value (the maximum value of garbage is comprehensively calculated according to the cleaning times of garbage trucks in the community and the average amount of garbage generated by families). After the trash can reaches the ground, the sanitation personnel will open the iron valve at the bottom of the trash can and clean it. When the cleaning is finished, the old people on the balcony can suck up the trash can by the electromagnet on the cover just by plugging in the power supply, which is convenient for the next use.

6. Design Advantages of the New Trash Can

The trash can is hung out of the window as a whole, which will not occupy indoor space. Elderly people with mobility difficulties can avoid taking out the garbage downstairs, and just open the garbage lid by the window to easily send the garbage downstairs. And parents who care for their children at home alone have more time to take care of their children.It is more convenient for garbage collectors to collect garbage, and it is only necessary for garbage trucks to clean trash cans regularly every week, so that the community can be kept clean.

7. Conclusions

With the development of urbanization, the renovation of old communities has become a widespread concern of society. On July 20th, 2020, the State Council issued “Guidance on Comprehensively Promoting the Renovation of Old Urban Communities” (No. 23 [2020] of The State Council office), upgrading the renovation of old communities as one of key tasks of the government.

The application of a new type of garbage can in the renovation of old communities thoroughly implements the guiding opinions on comprehensively promoting the renovation of old communities in cities and towns, and provides a new way to dump garbage for empty nesters and parents with children in old communities, so as to improve the overall deteriorating environment of old communities. Social development is changing with each passing day, and the application of new trash cans also reflects the progress of human civilizationand scientific development, which is also of great benefit to the development of society.

References

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