

Life Product Design Application - Glass Cleaner Desig

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Abstract

In this paper, we study the function and design of glass cleaner for household living products. Through research and practice to solve the following problems: 1. How to make the double-sided glass cleaner can be applied to different glass thickness and materials. 2. How to make the double-sided glass cleaner look beautiful and comfortable. 3. How to make the double-sided glass cleaner water sponge available for a long time, large cleaning area, more convenient to use. 4. With the continuous development of the modern economy and society and the continuous progress of science and technology, people's demand for double-sided glass cleaner purchasing power continues to rise, people living, office, leisure and other floor places building height continues to rise, the glass material and thickness also continue to transform and upgrade, which gradually produce trouble on the cleaning effect of the glass, the use of places higher floors, the operational safety also put forward higher requirements, for a long time in the With the expectation of increased comfort and portability during use, this paper investigates the design of an innovative double-sided glass cleaner that is more comfortable to use, more effective in cleaning, and can be used in more places.

Keywords

Double-sided glass cleaner, Product design, Comfortable, Safe.

1. Research Background

In many high-rise buildings, due to the glass lighting performance is good, practical and beautiful, strong thermal and moisture performance, more and more high-rise buildings have begun to choose glass transparent windows, in our daily life, are also everywhere, such as office buildings, libraries, exhibition halls and so on. However, glass as an isolation structure, accumulated over time, wind and sun exposure, the outer surface will inevitably have dust, dirt accumulation, will make the glass lose its original beautiful brilliance, in order to maintain the cleanliness and beauty of the building, it is also necessary for us to regular cleaning of the inner and outer glass, so there will be many problems, glass cleaning is not thorough, the outer layer of the existence of cleaning dead ends, part of the higher floors, improve the cleaning of the Difficulty. Now, most of our high-rise building glass cleaning methods, only regularly using manual aerial cleaning, which increases the risk of cleaning, such as in the wind and other weather should not operate, it reduces the cleaning efficiency, the use of manual cleaning, but also greatly increase the cost of labor, for businesses and individual families, in the course of a year, the more times the cleaning, the cost also increases.

So people want to have new ways of glass cleaning, not only easy to operate, cleaning effect, but also low cleaning costs.



Figure 1. Worker working at height to clean windows

2. The Issue Is Raised

2.1. Research Analysis

Double-sided glass cleaner is a kind of moving cleaning on both sides of the glass through magnetic phase attraction, the function has the ability to move through one side of the glass to achieve the simultaneous movement of both sides of the glass, when using, only need to stand on one side of the glass, safe, convenient and efficient. The double-sided glass cleaner can avoid problems such as difficult cleaning of the outer glass of high-rise buildings, unsafe and tedious manual work. It is removable, easy to clean and easy to use.

Despite the advantages of double-sided glass cleaners, most of the existing products do not have the function of magnetic adjustment. The magnetism of the glass cleaner also has a great relationship with the thickness of the glass, but also greatly affects the cleaning effect, if the same magnetic, single-layer glass magnetic large, mobile use of the more difficult, double glass magnetic small, the glass can not be absorbed on both sides of the glass, thus generating risk. Therefore, an adjustable magnetic glass cleaner, more cost-effective, better practicality, we found through the network and market field investigation, the existing adjustable magnetic type glass cleaner, single style, cleaning effect is not good, the glass dead ends are also difficult to clean. Grasp the way unreasonable, the handle design does not meet the ergonomic requirements, easy to produce fatigue after a long time of use [1].



Figure 2. Existing single-sided glass cleaners in the market

2.2. Summary of Issues

Through the research and analysis, it was found that there were some shortcomings in the use of the existing products: there were dead corners for cleaning, the design of the handle and the magnetic adjustment button did not meet the human-machine relationship, and the components outside the window were easy to fall off, etc. Based on the above problems, the team conducted a multi-faceted design study to redefine the image, contours, handle shape and

magnetic adjustment method. Based on the above problems, the team conducted a multi-faceted design study to redefine the product image, contours, handle shape and magnetic adjustment method. The team proposed superior solutions in terms of ergonomics, structure, function and cleaning efficiency.

3. Product Definition

3.1. Design Concept of the Product

When people clean their windows, they do not clean the windows facing the outside. It is even necessary to climb out of the window to clean it, causing personal safety problems. This is especially common in high-rise apartments in contemporary society. On the other hand, there are some shortcomings in the use of similar products. There was a need to redefine the product image, contours, handle shape, and magnetic adjustment method. This led to the conception of an efficient and safe glass cleaning product for high-rise residences.

3.2. Design Tasks

Breakthrough in the design thinking on the traditional way of cleaning the glass, upgrading and optimizing the old-fashioned glass-cleaning apparatus, in appearance, structure and use of function on the design of deep dive, full use and in line with the principle of mechanics and ergonomics, easy to operate, both practical and beautiful, can be applied in a variety of places, such as not easy to clean, high floor inconvenience places, in the size of the exquisite beauty, appearance and shape even if the It will not occupy too much storage space. The bottom of the handle is concave, so it can be used for a long time.

3.3. Definition of Modelling

In terms of the appearance and shape of the double glass cleaner, we have improved the shape of the double glass cleaner for many times and selected a suitable shape from it. Therefore, we modified the external lines of the product, abandoning the original too rigid straight lines and squares, and adopted curved triangles with a smaller curvature, and found a more suitable shape through continuous trial and error, which is easier to approach dead corners, and the triangular appearance is also more convenient for cleaning dead corners[2].

3.4. Color Definition

Combined with the appearance of the triangle design, based on design psychology and color composition theory, while taking into account the use of people and the use of the environment, the appearance of the color design for the light green and pink in two color design scheme.

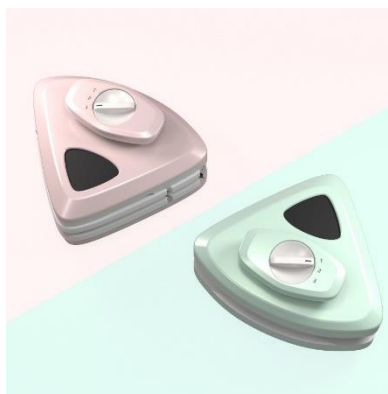


Figure 3: Design rendering of the double-sided glass cleaner

3.5. Ergonomic validation

The bottom of the handle is concave to provide a more comfortable and ergonomic handle position. The curved outer contour of the double-sided glass cleaner allows for less effort when turning the product. The distance between the two components is adjusted for different glass thicknesses by changing the magnetic force with a sunken knob [3].

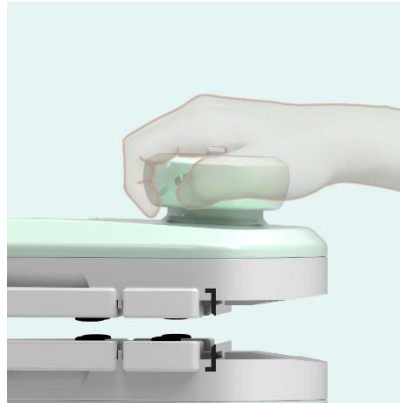


Figure 4. Ergonomics-based handle design

4. Product Solution Showcase

4.1. Product Design Statement

The glass cleaner consists of two assemblies, each with rubber wipers. The two assemblies are attached to each side of the glass by magnets. When in use, only one component needs to be dragged, which will drive the other one. The two squeegees move synchronously, which not only improves the efficiency of glass cleaning, but also ensures the safety of the operator, especially solving the problem of difficult glass cleaning in high-altitude residential buildings. The external lines are modified, abandoning the original too rigid straight lines and squares, and adopting curved triangles with smaller curvature, finding a more suitable shape through continuous trial and error, which is easier to approach the dead corners and more convenient to clean the triangular appearance. The bottom of the handle is concave to provide a more comfortable position for using the handle, which is more ergonomic. The curved outer contour of the double-sided glass cleaner allows for less effort when turning the product. The distance between the two components can be adjusted for different glass thicknesses by changing the magnetic force with the sunken knob.



Figure 5. Rendering of the double-sided glass cleane

4.2. Key Technical Notes

The triangular shape of the exterior facilitates the cleaning of sanitary corners. Curved outer contour saves effort when turning the product. The distance between the two components can be adjusted to fit different thicknesses of glass by changing the magnetic force with the sunken knob. The bottom of the handle is concave for better ergonomics. There is a sponge inside the product to store water, which will ooze out when wiped, with lubrication and cleaning effect. The length of the rubber squeegee has been increased to increase the cleaning efficiency. The main use of hot melt injection molding process.

4.3. Description of Use

Before use, immerse the product in water, the sponge in the product will absorb enough water. Remove the cleaning solution and apply it to the inner cotton cloth, corresponding the two components and attaching them to the inner and outer sides of the glass. To use, just dragging one component will drive the other. The two squeegees move synchronously to improve cleaning efficiency.

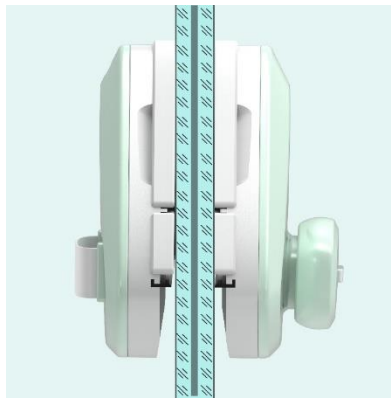


Figure 6. Absorption effect of double-sided glass cleaner

4.4. Design Difficulties

In order to make the handle more comfortable to hold, we have tested and verified the ergonomics of the handle shape, and have come up with what we think is the most appropriate handle model.

5. Conclusion

In this paper, through the background analysis of the content of the study, it is understood that people's demand for double-sided glass cleaner purchasing power continues to increase, mainly people living, office, leisure and other floor places building height continues to rise, the glass material and thickness of the continuous transformation and upgrading, which gradually produce the cleaning effect of the glass troubled, the use of places higher floors, the operational safety also put forward higher requirements for a long period of time. The expectation of comfort and portability in the use of the process increases. Faced with these problems, the first step is to understand the basic principles of using double-sided glass cleaners and their basic dimensions through Internet research. Then through the network and product research into the market, collect the different types of double-sided glass cleaner for different places and thickness, compare their shape, improvement points, strengths and weaknesses, difficulties in use, etc., and understand people's multiple needs and comfort in the use of the process, as well as some basic needs of the double-sided glass cleaner and improvement suggestions, and finally summarize the collected products. Suggestions for improvement are given to find design inspiration and problems to be avoided. The adjustable magnetic design of the double-sided

glass cleaner allows for different glass thicknesses and materials. The redesign of the exterior shape improves the aesthetics of the window cleaner. Through ergonomic analysis, the window cleaner handle was designed to be more ergonomically friendly, easier to use and less fatiguing. The longer rubber hanging strip, the larger cleaning area. In summary, this paper has solved the problems raised in the early stage, and designed a more easy-to-use double-sided glass cleaner.

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