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The Utility Model Relates to a Structure Design of a Drawbar Trolley with a Telescopic Stool

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ABSTRACT

As a convenient handling tool, the pull rod car can use people's pushing and pulling to easily carry heavy objects, achieve the handling tasks that people need to complete, and reduce the burden on the shoulders and arms. The use of a trolley can reduce people's physical consumption, avoid overwork, especially suitable for long walks or need to carry a large number of items. Its biggest advantage is that it can complete different handling tasks through simple operations, so as to help people easily move items. The main design task of this paper is to transform the traditional draw-bar car, so that it has the function of telescopic stool and upstairs power. The design aims to solve the problem of carrying items and needing rest during shopping, providing a more convenient shopping experience. The specific design idea is to take the stool as the main body, and the shopping cart becomes its auxiliary function; The slider is used as a telescopic mechanism to realize the smooth expansion and contraction of the stool; Add the upstairs power function to drive the shopping cart upstairs through the motor and remote control. In terms of technical implementation, the base is welded with steel, the stool is made of high-strength polymer materials, and the telescopic mechanism is made of sliders. This paper mainly uses UG to carry out 3D modeling.

KEYWORDS

Telescopic Stool; Upstairs Power; Pull Rod Car; Convenient.

1. INTRODUCTION

1.1. Purpose and Significance of This Design

A trolley with telescopic stool and power function of going up the stairs is an innovative shopping handling tool, and its market prospect is very broad. With the improvement of people's living standards and the increase of consumer demand, shopping has become an indispensable part of everyone's daily life. In the process of shopping, handling goods and need to rest is a very important problem, we found that many elderly people have inconvenient legs and feet, and always carry heavy things when they go out to purchase, for the elderly who have no elevator apartment and inconvenient legs and feet, carrying things will have a great burden, after climbing the stairs and sitting on the ground will directly contact with the ground. Sitting on the cold ground for a long time will gradually invade the human body, resulting in a series of diseases such as diarrhea and cold. This problem is more prominent. Therefore, a new type of trolley that can provide a telescopic stool and upstairs power function can greatly meet people's shopping needs and improve the shopping experience.

1.2. Development Trend of Pull Rod Car

Whether in ancient times or now, people can not do without shopping, but for a long time to carry heavy objects, the human body will be unbearable, so the pull rod car also appeared, it can only rely

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on people to push and pull to easily carry heavy objects, to achieve the carrying task that people need to complete, reducing the burden on the shoulders and arms. The trolley can reduce people's physical consumption, avoid overwork, and is especially suitable for walking for a long time and carrying a large number of items. In general, the rod car is a practical handling tool, with the advantages of convenient handling, energy saving, versatility and easy operation, which can help people efficiently complete the handling task and improve work efficiency. However, due to the growth of aging in China, many elderly people live alone in old neighborhoods. Even though there are trolley carts to help elderly people reduce the burden of carrying goods on the road, there is no elevator in these places, and elderly people need to carry things upstairs by themselves when they go home. Due to the lack of physical support for elderly people, it is difficult for elderly people on high floors to lift heavy items easily. At this time, it is necessary to have a place to rest halfway and a trolley that can provide power to assist the elderly to carry items upstairs, which can greatly help the elderly to reduce the burden of carrying home after shopping.

1.3. Main Research Contents and Research Ideas

The design of this paper mainly refers to the ordinary pull rod car and patents in China, and completes the scheme selection, structural design, two-dimensional drawings and three-dimensional modeling of the pull rod car with telescopic stool and upstairs power function

Main research contents:

By referring to the relevant research quality data of the trolley with seat in China, the factors affecting the trolley with seat are found out, and the problems that may exist in the process of the telescopic stool expansion of the trolley with seat are analyzed, and the relevant protection is done for the design of the trolley with seat.

Determine the position of the power device required for the drawbar car to avoid occupying too much land and affecting the overall beauty

CAD and UG are used to complete the creation of 2D and 3D graphics of each part of the manipulator, and UG is used to complete its assembly to see whether there is interference between the parts.

Based on the research content, the following research ideas are proposed:

First of all, check the relevant materials for the project selected by oneself, and analyze according to the materials; The shortcomings of the current draw-bar car are studied, and then it is perfected according to the shortcomings.

Then, the structure design and assembly of each part of the drawbar car, and after assembly, check whether there is interference or improper design between the parts.

2. THE MAIN PLAN OF THE DRAWBAR CAR IS DETERMINED

2.1. Design Requirements and Working Parameters

The design requirements and working parameters of the drawbar car with telescopic bench and upstairs power function are as follows:

The telescopic stool of the drawbar car is required to have good quality, stable connection and stable working performance.

The overall height of the trolley is 1230mm

Telescopic stool, length, width and height of 340mm×250mm×30mm;

The Angle of the triangle wheel is 60°

Shopping basket length 370mm, width 418mm, depth 415mm

2.2. Determination of the Movement Mode of the Trolley

There are a variety of ways of working, in the usual circumstances, the work of the rod car can be divided into: flat pulling mode, flat rest mode, stair pulling mode and stair rest mode

(1) Flat pulling mode refers to the user in the shopping road to pull goods using the front wheel of the rod car tilt pulling goods or the rod car four wheels are placed horizontally using the motor to provide power to move forward.

(2) The flat rest mode is to place the four wheels of the trolley horizontally and fix the rear wheel, and pull out the telescopic stool to provide a seat

(3) Stair pulling mode, this way is mainly through the rotation of the triangle wheel on the stairs to drive the rod car upward movement can use manpower or motor two driving methods

(4) The stair rest mode is to stretch the rear wheel of the trolley through the telescopic rod, so that it forms a horizontal plane with the front wheel at the upper level of the staircase, and after the rear wheel is fixed, the telescopic stool can be drawn out for rest.

2.3. Design Idea of Pull Rod Car

2.3.1. A Trolley that can go up the Stairs

Through the design of the front wheel of the trolley, the wheel is designed into a triangle wheel composed of three small wheels according to the equilateral triangle, and the rotation of the triangle wheel can drive the trolley up when going up the stairs.

2.3.2. Retractable Stool

The telescopic stool has two states: folded state and unfolded state. In the folded state, the stool is combined with the trolley to form a compact whole. When it is necessary to use a stool, through a simple operation, the stool can be extended in the corridor to provide the elderly with a place to rest. This design can meet the needs of people who need to rest or wait during the shopping process.

2.3.3. Upstairs Power

In view of the pain points of upstairs handling, our design adds the upstairs power function. The specific way is to install a motor under the shopping basket of the trolley, and connect the battery and the remote control. When the rod car needs to go upstairs, the user only needs to press the button on the remote control to start the motor and drive the rod car to move up.

Figure 1. Schematic diagram of a pull rod car

3. STRUCTURAL DESIGN OF PULL ROD CAR

3.1. Main Structure Design of Drawbar Car

3.1.1. Design of Shopping Basket

The shopping basket UG model is shown in Figure 2.

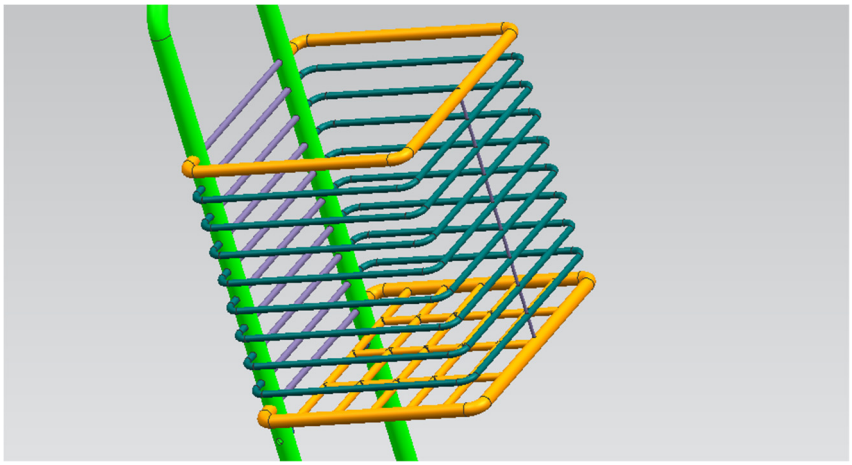

Figure 2. 3D model of shopping basket

The shopping basket is composed of a U-shaped frame, which can be loaded when the shopping bag is put into the frame, and the grid at the bottom can effectively prevent items from falling. The front end of each U-frame is connected by a rod, and the middle of the back end is connected by a vertical rod, which can also be folded up when not in use to reduce space.

3.1.2. Design of Telescopic Stool

UG 3D model diagram of telescopic stool:

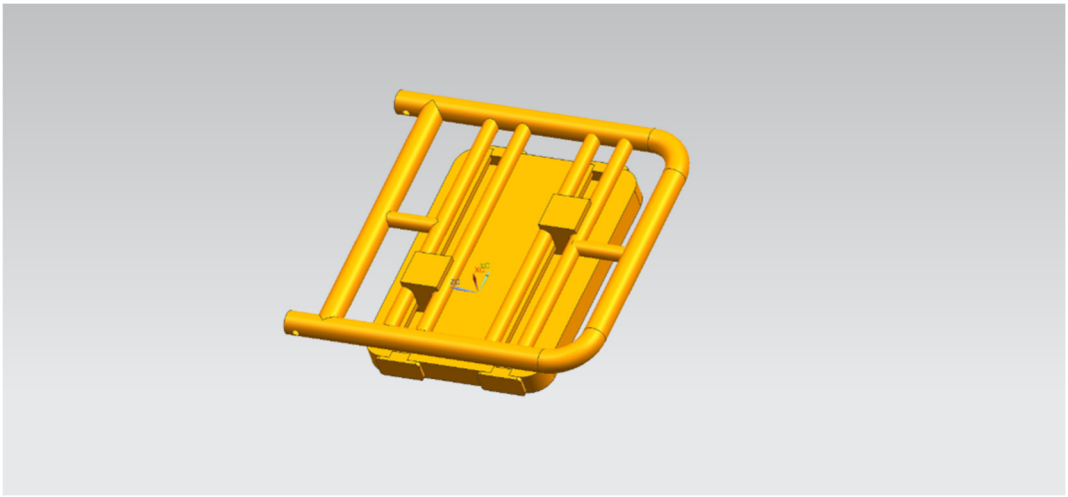

Figure 3. Three-dimensional model of the telescopic stool

The telescopic stool is divided into stool and stool fixing plate two parts, the telescopic stool at the end of the fixed block with the telescopic stool, the block is connected with the stool fixing plate, there are two sliding blocks on the stool fixing plate, through the sliding of the two sliding blocks can achieve the telescopic stool out and storage.

3.1.3. Universal Wheel Design

The universal wheel is composed of telescopic rod, wheel, spring plate, pressure plate and brake pad. When you want to adjust the height of the universal wheel, the pressure plate can be stuck at the desired height. When you want the rod car to be fixed and no longer move, the brake pad can be locked to lock the wheel shaft.

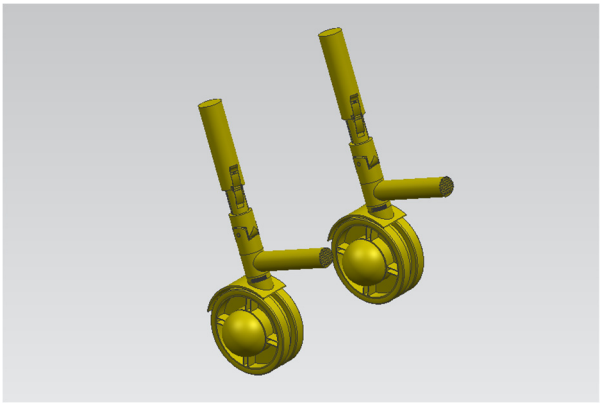

Figure 4. Three-dimensional model diagram of the cardan wheel

3.2. Design of Power Transmission System Structure

UG 3D model of motor and output shaft

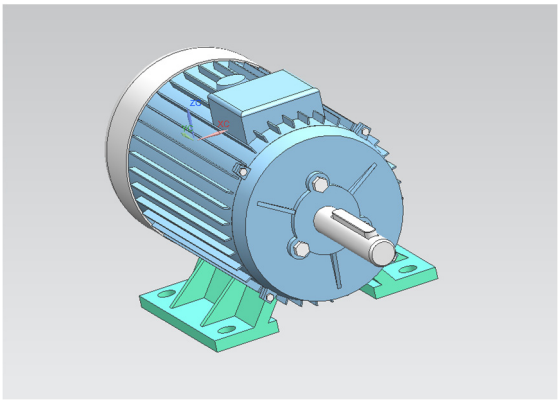

Figure 5. 3D model of the motor and output shaft

The pulley is connected by a key, which can ensure the stability of the connection and reduce the loss of power.

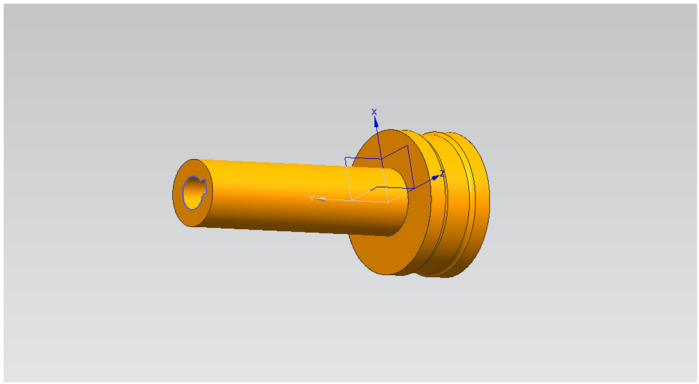

Figure 6. 3D model of the large pulley

The large belt wheel is connected with the small belt wheel on the triangle wheel through the belt transmission power to drive the rotation of the small belt wheel, the small belt wheel and the triangle wheel through the bolts and special-shaped holes connected to drive the rotation of the triangle wheel to achieve the upstairs function.

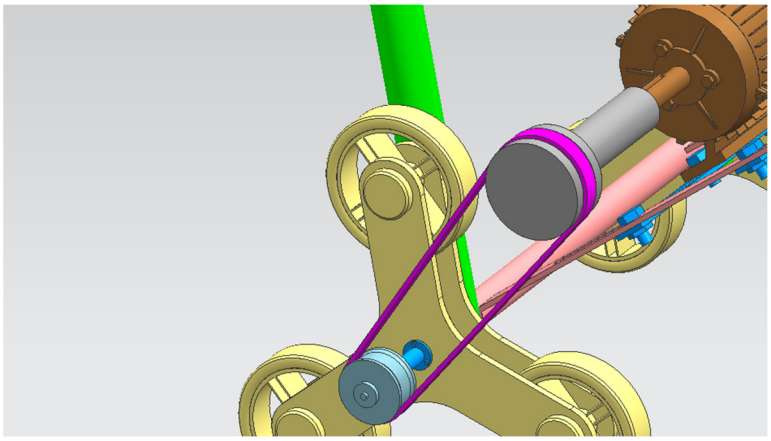

Figure 7. Three-dimensional model of connecting large and small belt wheels

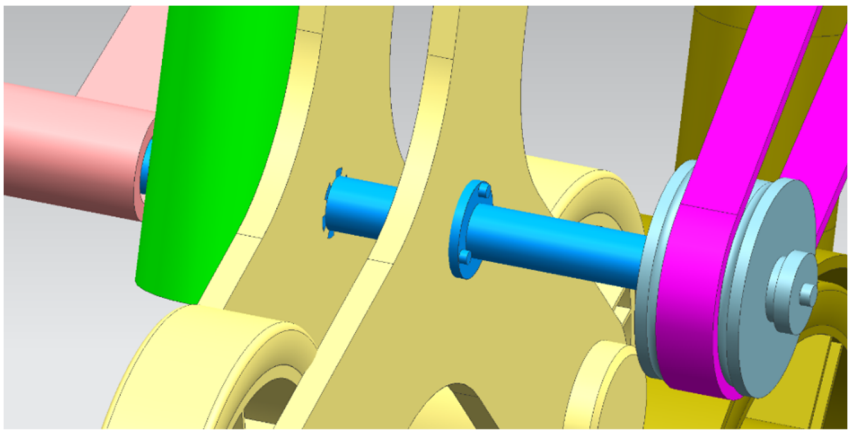

Figure 8. Three-dimensional model of connecting small belt wheel and triangle wheel

4. THE ESTABLISHMENT OF THREE-DIMENSIONAL MODEL OF UG DRAW-ROD CAR

The models of U frame, telescopic stool, triangle wheel, universal wheel and other parts of the drawbar car are established by using UG 3D modeling software. Here are some 3D model drawings of the parts:

Figure 9. U-frame

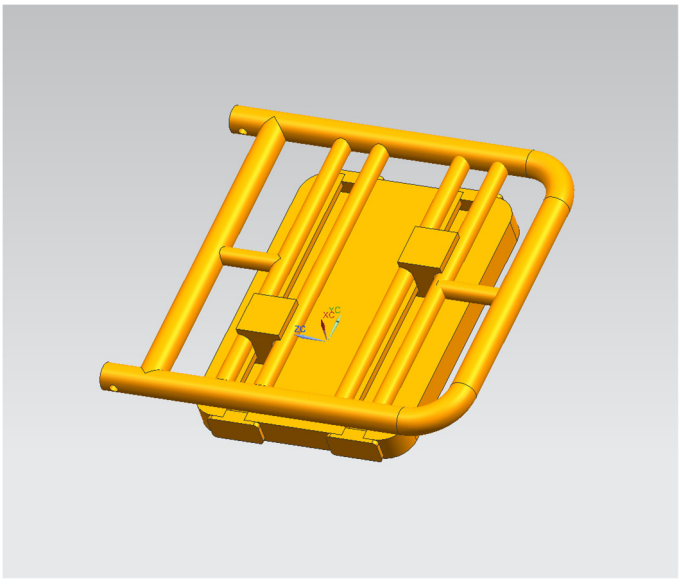

Figure 10. Retractable stool

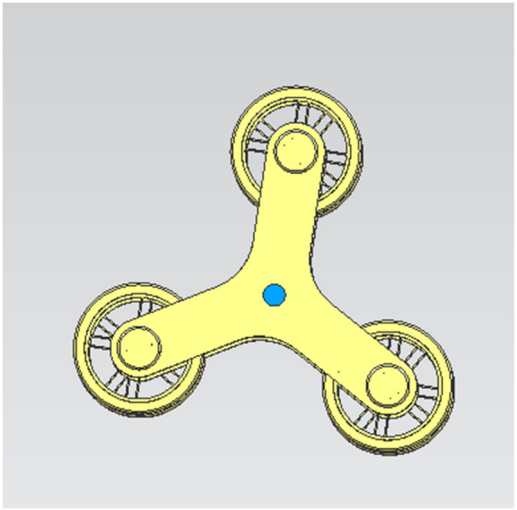

Figure 11. Triangle wheel

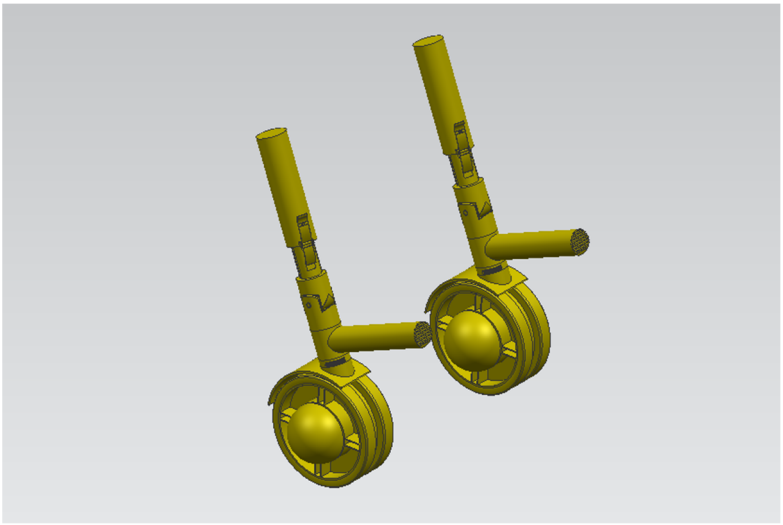

Figure 12. universal wheel

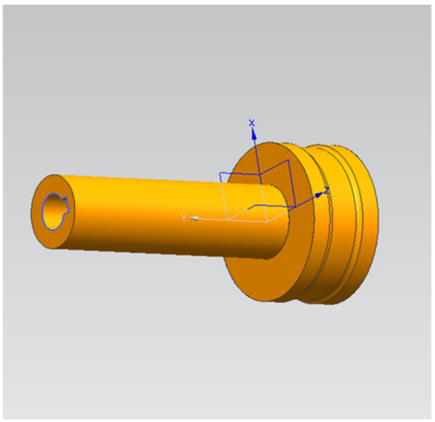

Figure 13. Large belt wheels

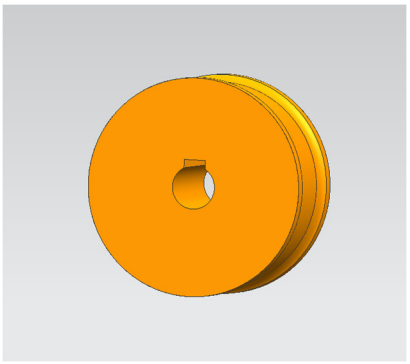

Figure 14. Small pulley

4.1. Assembly of 3D Model of Wooden Furniture Spraying Manipulator

(1) Assemble these three large parts separately according to the order of X axis, Y axis and Z axis, and the constraints must be completely constrained during assembly;

(2) Assemble the three components of the X axis, Y axis and Z axis, and check whether there is interference.

The main view and axonometric chart are three dimensional assembly drawing of the drawbar car.

Figure 15. Main view

Figure 16. axonometric view

5. CONCLUSION

Through the teaching of this system, we combine the basic knowledge learned with the work practice, master the corresponding basic knowledge, but also improve the practical skills. It has improved the

knowledge learned, solved practical engineering problems, and improved the use of 3D modeling and 2D graphic design software.

At the beginning of this paper, I consult the relevant information of the drawbar car and the relevant design of the drawbar car, find inspiration from it, carry out the relevant optimization design of the drawbar car with seat, make it meet the results to be obtained, and verify the results.

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