

A Design Plan for a New Peanut Picker

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Abstract

Agricultural mechanization is the main direction of agricultural development. The popularization of agricultural mechanization can promote the transformation from traditional agriculture to modern agriculture. Peanut is one of the most important economic crops in China. The harvesting and processing of peanuts is very important. In this design, the working principle of the peanut picker is mainly introduced. The design process and the modeling process meet the design requirements of the peanut picker. This kind of fruit picking machine is low in cost, convenient for maintenance and repair, and suitable for promotion in rural areas. Designing a peanut picking machine can improve picking efficiency and save manpower and material resources.

Keywords

Peanut picking machine, Roller comb brush stick, Stem collection.

1. Peanut fruit picker design significance and requirements

Peanut is an oil crop with high oil yield and high-quality protein resources. China is also one of the most important peanut export countries in the world. Therefore, the harvesting and processing of peanuts is very important. During the harvest of peanuts, fruit picking is a key operation. Using mechanical picking can improve ergonomics and reduce losses. At the same time, timely picking of peanuts can reduce peanut rotting and worm erosion.

The requirements for the peanut picker are as follows:

- (1) High fruit picking efficiency, high picking rate, and low fruit breakage;
- (2) When picking fruit, try not to make the stem broken and ensure that the stem is intact;
- (3) The fruit picking machine must consider a variety of complex working environments, durable, safe and reliable, simple to use, maintain, and maintain, and suitable for promotion in rural areas;
- (4) The structure should not be too complicated and consume less power.

Peanut fruit grows in the rhizomes of the plant, where there are more dirt and gravel in the rhizomes, so the design cannot be too precise. Peanut plants generally have a length of 500-700mm, so the size of peanut plants should be taken into consideration when designing. The general length of peanut fruit is 30-40mm and the width is 10-13mm. Therefore, the design of the original fruit can be selected according to the design and original selection.

2. The overall structure design scheme of the peanut picker

2.1 An Introduction

According to different picking principles, different picking machines can be designed. Therefore, according to the principle can be divided into the following kinds of fruit picking program:

Rubbing and picking fruit: between the peanut fruit and the original fruit picking and between the fruit, the rubbing effect between the fruit and the stem causes the fruit to fall off. Such as pattern drum roller picker.

Comb brush picking fruit: peanuts produce fruit and pull the original pull between the fruit and make peanuts fall off. Such as nail-type picking machine.

Impact picking: The mutual impact of the peanut fruit and the original picking causes the fruit to fall off. Increasing the impact velocity of the impact element can increase productivity and net lift rate. Such as nail-type drum picker.

Although the above principles are different, in the actual process of designing a peanut picking machine, a single principle cannot be used for fruit picking, and one of the principles should be designed to assist one or more of the others in a coordinated manner operation.

2.2 plan selection

When designing the peanut picking machine, the structure should not be too complicated, the installation is simple, and the manufacturing cost is low. The principle of picking fruit by impact can be combined with the principle of comb brush picking fruit. The principle of impact is dominant and the principle of comb brush is supplementary.

Therefore, the selection plan is: roller comb brush stick type peanut picking machine, its working principle is that after the peanut plant enters the fruit picking part, it peels off the fruit under the striking of the fruit picking bar, and at the same time, the design of the fruit picking bar is denser, and at the same time it has a certain comb brushing effect. , can also play a role in picking fruit.

Here are some schematic diagrams of typical picking agencies:

- 1 - Roller drum picking mechanism; 2 - spike roller picking mechanism;
- 3 - bow tooth picking mechanism; 4 - roller and conveyor belt gravure picking mechanism;
- 5—Double nail roller drum picking mechanism; 6—Double roller drum picking mechanism;
- 7—Conveyor belt picking mechanism; 8—Axial flow picking mechanism.

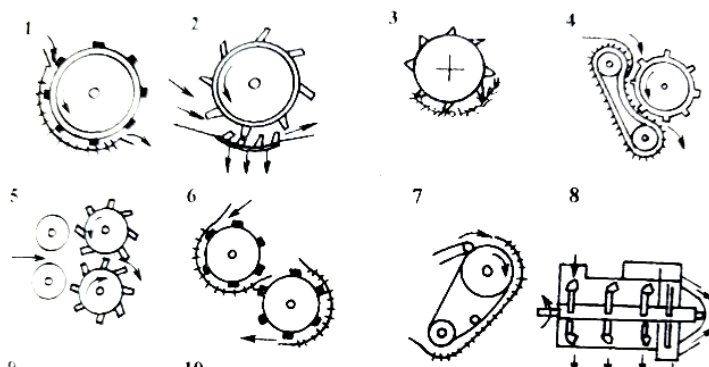


Fig. 1 Type of fruit picking organization

3. The working principle and main structure of peanut picker

The peanut picking machine is mainly composed of six parts: feeding part, transmission part, fruit picking part, wind selection part, fruit collection part and box part. The six parts work together to complete the peanut picking operation. The fruit picking part is the core component of the peanut picker.

The following is a description of the various parts of the peanut picker:

(1) feeding section

The feeding part is an important part of the peanut plant through the feeding port into the body of the peanut fruit picker. At the same time, it also constitutes the whole box of the peanut picking machine. When designing this part, it is necessary to ensure the smooth entry of peanut plants, and to ensure that the plants will not fly out of the feeding port under the high speed rotation of the picking roller after entering. The unreasonable design of the feeding port will cause the original picking to wear out and even damage. The filling mode of the feeding port should be coordinated with the working mode of the main working shaft. If the packing mode is not conducive to the work of the working shaft, it is very likely that the loading of the working shaft will be momentarily increased, the stress of the working shaft will be changed, and the shaft may even be damaged. At the same time, the safety of

the operator should also be taken into account when designing the feed port. The feed inlet should not be too large, to ensure the safe operation of the peanut picker. The feed port can be designed as a feed funnel.

(2) Transmission section

The transmission section acts to transfer the rotation of the motor to the peanut picking section. Due to the more complex working environment of the peanut picker, peanuts have more soil and debris. The belt drive has the characteristics of simple structure, smooth transmission, low cost and shock absorption and shock absorption. The belt drive also has the characteristics of slipping when the load is too large. It can not only protect the motor from burnout in the case of a boring car with a three-phase asynchronous motor, but also It can protect people and property when people or other objects are hinged. Therefore, choosing the V-belt drive is the most appropriate.

(3) Fruit picking section

The role of the fruit picking part is to separate the fruit from the peanut plant. As the core part of the fruit picking machine, the fruit picking part can be designed into a drum shape. The original surface of the drum surface that hits and hits the fruit can be arranged in a comb arrangement, which can ensure the striking effect and can also have a certain comb brushing effect. The main shaft is used to drive the rotation of the drum. In fact, the shaft and the drum can be connected by using a key. And the use of flat key links, the advantages are simple structure, easy disassembly, maintenance and repair simple, good for neutral and so on. When supporting the shaft, you can choose to use the bearing and choose the appropriate support scheme.

(4) Wind-selection section

The role of the wind-selection part is to separate the fruit from the part of the picking fruit. The wind-selection part blows the peanut plants out of the box by the fan's blast action and the fruit enters the peanut fruit collection device through the screen. The screening structure can be designed as a mesh structure, and it should be noted that the mesh size enables the peanut fruit to fall accurately into the peanut collecting device.

The fan blades also rotate through the rotation of the shaft. The fan blades are not easily depleted. The fan blades can be directly welded to the shaft and the shaft can be rotated by a three-phase asynchronous motor.

(5) Box section

The main function of the box is to support the transmission, fruit picking and winnowing. The stable and smooth operation of these three parts determines the stable operation of the peanut picker. At the same time, the lower box also has the protection of the original to prevent debris from entering the body and protecting the safety of the operator.

(6) Fruit collection section

After the peanut fruit passes through the winnowing device, it falls into the fruit collecting device, and the fruit collecting device can be designed as an inclined plate. The peanut picking machine will inevitably produce some vibrations during normal operation. These vibrations can help the peanuts slide out of the box along the sloping plate and allow the operator to collect it. The design of sloping plate collection can both simplify the design and save resources.

(7) Stem collection section

After the peanut plant has been picked up by the fruit picking mechanism, fans blow out the box and a blocking mechanism can be designed to prevent peanut stems from being blown. After the stems pass through the blocking mechanism, they can be placed neatly in the prescribed position to facilitate the collection and arrangement of the staff. Here, the blocking mechanism can be provided in a quarter-circle shape, which not only facilitates the passage of the fan wind, but also simplifies the design.

According to the above design plan, the design of the picking machine is as follows:

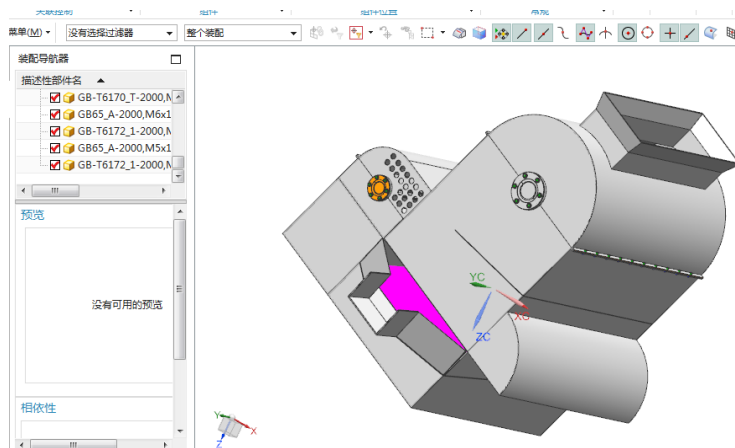


Fig. 2 Peanut picking machine overall diagram

4. Conclusion

The advantages of the peanut picker are: high fruit picking efficiency, can complete the larger workload of picking peanuts in a short period of time, saving time and a lot of human and material resources. The structural advantages are simple design, easy installation, and simple maintenance and repair. Smooth operation, less vibration, high safety factor. The advantages of fruit picking are the low rate of fruit breakage, relatively complete plant guarantee, high versatility, and application to plants of various lengths. At the same time, the cost is relatively low and it is suitable for promoting rural promotion.

The disadvantage of the peanut picker is that it is not fully automated and manual feeding is still required. The fruit picking rate is not particularly high, especially for fruits with smaller fruit size and cannot be completely picked. This kind of fruit picker has a large volume and weight and is not suitable for frequent movements. At the same time, there are many places where the design is unreasonable. I hope you can put forward criticism and suggestions for improvement.

In general, this peanut picking machine is suitable for practical life and production, and can play a corresponding role in the harvesting and processing of peanuts.

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