DESIGN AND FABRICATE AN OPTIMIZE MECHANISM FOR FRUIT PLUCKER TO BE COMMERCIALIZED

NOOR ASMAH BT ARSHAD

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

PENGESAHAN PENYELIA

" Saya akui bahawa saya telah membaca
karya ini dan pada pandangan saya karya ini
adalah memadai dari segi skop dan kualiti untuk tujuan penganugerahan
Ijazah Sarjana Muda Kejuruteraan Mekanikal (Rekabentuk & Inovasi)"

Tandatangan :……
Nama Penyelia I : EN. MOHD ASRI BIN YUSUFF
Tarikh : MEI 2010

Tandatangan :……..
Nama Penyelia II : EN. HAMZAH BIN MOHD DOM
Tarikh : MEI 2010

"I hereby to declare that this project report entitle DESIGN AND FABRICATE AN OPTIMIZE MECHANISME FOR FRUIT PLUCKER TO BE COMMERCIALIZED is written by me and is my own effort except the ideas and summaries which I have clarified their sources."

Signature	:……
Author	: NOOR ASMAH BT ARSHAD
Date	: MAY 2010

To my lovely parents, Mr. Arshad b Bahari and Mdm. Halijah bt Ahmad, for everlasting supports, Mohd. Ashaari b Omar, friends, Dila Afnida Bt Azman, Suhaila binti Mat Said and my housemates, lecturer, Mohd Asri bin Yusuff for guiding and endless help during the preparation of this report.

ACKNOWLEDGEMENT

Greatest praise to Allah Almighty. Grateful to Him with His will I had successfully finished in preparing this 'Projek Sarjana Muda' thesis.

Several people played an important role in the accomplishing of this 'Project Sarjana Muda' thesis and I would like to acknowledge them here.

I owe my most sincere gratitude to Mr. Mohd Asri b Yusuff. I would like to thank him for his guidance, support, advices and time during the course of my project. I would like to thank Mr. Hamzah b. Mohd Dom in taking an effort in reading this thesis and provide good suggestion in perfected this thesis.

Special thanks to FKM technicians whom are patient in giving me a lot of advice and useful tips in performing the research.

Last but not least, I owe my loving thanks to both of my parents, Mr. Arshad b Bahari and Mdm Halijah bt Ahmad. Without their encouragement and understanding it would have been impossible for me to finish PSM. My special gratitude is due to my friends Mohd Ashaari b. Omar, Dila Afnida bt Azman, Ahmad Faruqy b. Mohamad Shabari, Suhaila bt Mat Said, Izzati Mahirah bt Ismail and Nur Izrin bt Mahyon whom help me in giving an idea and support to finish this thesis.

ABSTRACT

The main purpose of this project is to design an innovative and optimize fruit plucker to compete with others in the market. This project primarily focus on development of fruit plucker within the good design characteristics such as ergonomic, easy to fabricate, with austhetic value, with the lowest price and etc. The provision of mechanical fruit plucking device, as aforesaid, which is small in size and simple enough to be hand held and manually operated by the usual farm laborer whether such laborer be a man, woman or child. Previous attempts have been made to provide powered plucking equipment. However, such proposed equipment has for one reason or another not been completely satisfactory. For example, some of the existing pluckers are very large, weighing hundreds of pounds and therefore expensive to purchase and maintain. Fruit plucker with efficiently mechanism will develop through this project and will meet customer requirement where can help people easily pluck local fruits such as mango, mangosteen, *rambutan*, *duku* and *langsat*.

ABSTRAK

Tujuan utama projek ini adalah untuk mereka cipta pemetik buah yang inovatif untuk bersaing dengan pihak lain di pasaran. Projek ini terutamanya berfokus pada proses mereka cipta pengait buah yang mempunyai kriteria rekebentuk yang baik seperti ergonomik, mudah untuk difabrikasikan, mempunyai nilai estetik, harga terendah dan lain-lain. Penyediaan pemetik buah peranti mekanik, sebagaimana disebutkan di atas, adalah bersaiz kecil dan cukup sederhana untuk dikendalikan secara manual oleh buruh tani biasa yang terdiri daripada golongan lelaki, perempuan atau anak-anak. Sebelumnya usaha telah dilakukan untuk menyediakan peralatan pemetik buah. Namun, seperti peralatan yang telah dicadangkan masih lagi tidak memenuhi kehendak pengguna. Sebagai contoh, beberapa pemetik buah yang ada sangat besar, dengan berat ratusan kilogram dan mahal serta tidak tahan lama. Pemetik buah dengan mekanisme yang efisyen akan dihasilkan melalui projek ini dan akan memenuhi keperluan pelanggan di mana boleh membantu orang ramai dengan mudah memetik buah-buahan tempatan seperti mangga, manggis, rambutan, duku dan lansgsat.

CONTENT

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

1.1 Background

Fruit plucker is fruit plucking equipment which uses to help people pluck fruit in easy way and save time. Normally, people pluck the fruit with a pair of scissors. The plucking person grasps the fruit in his left hand, for example, and cuts the branch supporting the fruit with the scissors held in his right hand. It is necessary to use both hands and stair for tall trees. Fruit plucker is created to help people easily pluck fruit whether at shrubs or tall trees. As we know, Malaysia is rich with local fruits. To ensure the fruit is not damaged during picking, fruit plucker was designed. Basically fruit plucker has a pair of scissors with a stationary member and movable member each provided on its top portion with a cutting edge to cut fruit stems there between. This project relates in general to an improvement in fruit plucker equipment which is primarily focus on mango, '*rambutan'*, mangosteen, '*langsat'* and '*duku'* which may be hand held and hand operated.

1.2 Problem Statement

Previous attempts have been made to provide powered plucking equipment. However, such proposed equipment has for one reason or another not been completely satisfactory. For example, some of the existing pluckers are very large, weighing hundreds of pounds and therefore expensive to purchase and maintain. Thus, it is not practical to use them in any largest farming or harvesting operations. Also such equipment is much too complex to be operated by the normal laboring force available to the fruit agriculturist and also much too large to use by the woman and children who provide much of this labor force. Moreover, it cannot be maneuvered between the bushes on many farms. In addition, fruits will fall to the ground which caused obvious permanent fruit damage.

Smaller hand-operated plucking devices have also been proposed and although these devices may be more desirable in the normal farming operation than the very large plucker yet they have had certain disadvantages. For example, many such plucking devices tend to remove all of the fruits, failing to discriminate between ripe and unripe fruits. Fruits will also fall to the ground which caused obvious permanent fruit damage.

1.3 Objective

To perform this project smoothly, several objectives are aimed in order to achieve the project goals. Among the objectives are:-

a) To design an innovative and optimize fruit plucker mechanisme to compete with others in the market.

b) To provide a fruit plucking device which can safely pluck fruits on a tall tree.

1.4 Scope Of Project

This project is narrowed down to certain scopes that been identified based on project objectives. Among the scopes that been emphases are:

a) To develop a fruit plucker within the criteria such as ergonomic, easy to fabricate, with austhetic value.

b) The provision of mechanical fruit plucking device, as aforesaid, which is small in size and simple enough to be hand held and manually operated by the usual farm laborer whether such laborer be a man, woman or child.

c) To design and analysis using engineering software, CATIA V5R19 and CATIA structural analysis.

1.5 Report Frames

This project entitled “Design and Fabricate an Optimize Mechanisme for fruit plucker to be Commercialized” can be divided into five chapters.

Chapter I which is the introduction explains the general information of fruit plucker. The elements that consist in chapter 1 are background of fruit plucker, problem statement of the project, scope of projects, objectives of project and report organization.

Chapter II comprises literature review information which includes research of previous project of fruit plucker by others. This chapter also includes existing fruit plucker in market.

Chapter III present the methodology of the project. This chapter is discussing the method used throughout the development of fruit plucker. It started with the section identifying customer needs using interview method. Concept selection method and software use to generate the design also had been explained in this chapter. The steps involve in the process of develop fruit plucker are described in detail in this chapter.

Chapter IV present the conceptual design of fruit plucker. This chapter show 4 new concept designs and explanation of each concept. Besides, 3D modelling drawing and part number also include in this chapter. Other element include in this chapter are the design analysis using CATIA Structural Analysis software and manufacturing process flow of the product.

Chapter V The project is concluded with Chapter V which discusses the conclusion and recommendation of the project based on the objective and the relationship with problem statement presented in Chapter I

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter discusses about the fruit plucker project was done by others before and the existing fruit plucker in market. In the past, people do not use any equipment to pluck the fruits. Only climb trees to get fruit itself because there is no technological sophistication. Nowadays, there are many types and designs of Fruit plucker which is created for safety where we do not need to climb the tree to pluck the fruits for example Berry Fruit Plucker.

Figure 2.1: People climb tree to get fruits itself
(Source: http://www.goachitra.com/research.html)

2.2 Berry Fruit Plucker

There is a body of project that focuses on fruit plucking equipment and more particularly relates to pneumatically powered, reciprocating berry plucker which may be hand held and hand operated. For many years, blueberries have been picked entirely by hand using itinerant laborers who would move into the fruit belt for the duration of the harvest season and would then move on to other seasonal work. Due to rising wages by such laborers and due to the shortage of such laborers in recent years the agriculturist has found it necessary to seek ways for increasing substantially the harvesting volume per man hour worked.

These plucking devices work well in the later part of the harvest season when all of the remaining berries are ripe, but they are not satisfactory for use earlier in the season. Accordingly, a primary object of the invention is to provide a power-driven, mechanical berry-picking device which is capable of adjustment and which vibrates the limbs of the berry bushes thereby selectively causing the ripe berries to fall while leaving the unripe berries. Other objects and purposes of this invention will be come apparent to persons familiar with the harvesting of berries or similar fruit upon reading the following descriptive material and examining the accompanying drawings.

2.2.1 Detail Description

The device 10 (Figure 2.1 and 2.2) for picking berries 12 from bushes 13 includes a base 14, a motor 16 and a finer assembly 17. The picking device 10 is connected by the conduit 18 to a source (not shown) of pressurized fluid such as air.

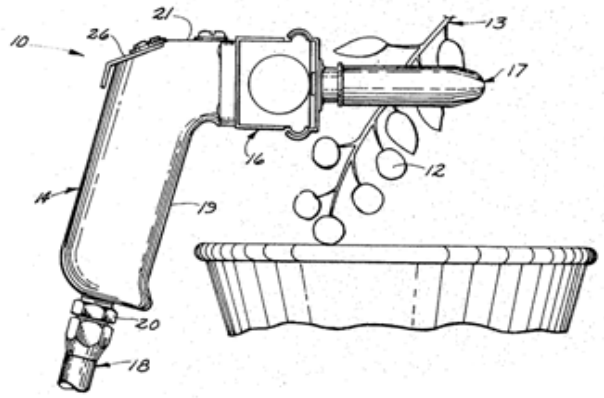

Figure 2.2: Side elevational view of the berry-picking device of the present invention in a position of operation.

(Source : http://www.freepatentsonline.com/3522697.pdf)

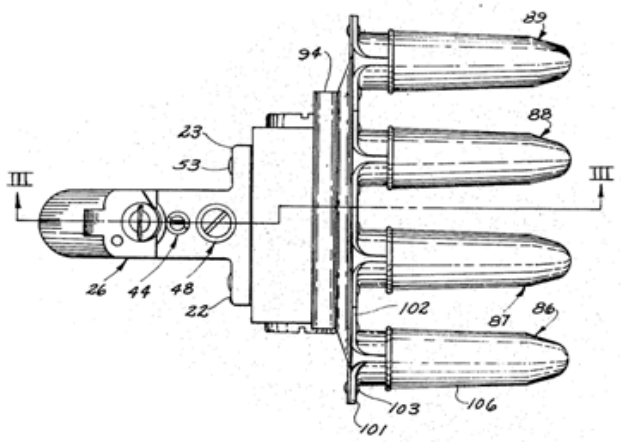

Figure 2.3: Top view of said device.

(Source : http://www.freepatentsonline.com/3522697.pdf)

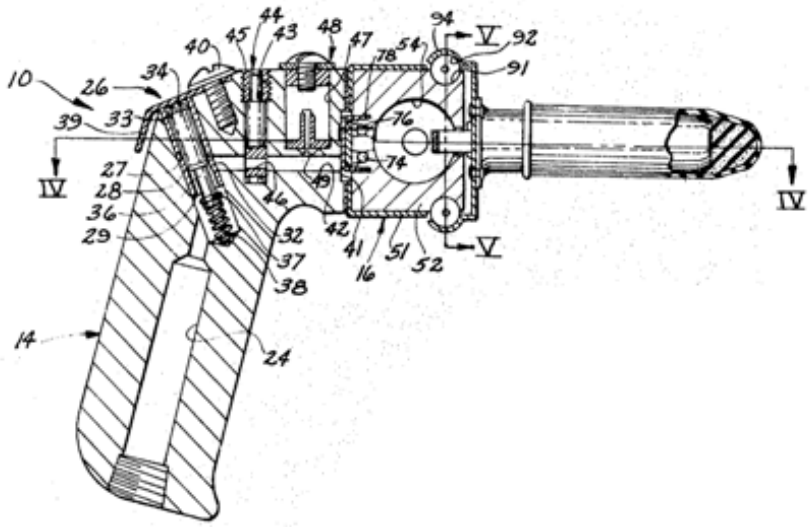

Figure 2.4: Sectional view of the device taken along the line III – III in figure 2.2 (Source : http://www.freepatentsonline.com/3522697.pdf)

The device 10 while so operating is moved along or held against the branches 13 containing berries 12. The fingers 86, 87, 88 and 89 engage the sides of the branches 13 and shake the ripe berries 12 from the branches 13 into the container.

If the finger assembly 17 is reciprocating too rapidly and thereby shaking unripe berries from the bushes 13, or if the finger assembly 17 is reciprocating too slowly and therefore leaving some ripe berries on the bushes, proper adjustment can be made by rotating the valve 44 as needed to move the opening 46 into greater or lesser communication with the passageway 42, thereby permitting a greater amount or lesser amount of air to pass to the motor 16.

2.3 Existing Product In Market

Figure 2.5: Mangosteen Hook

(Source: http://galahsambung.blogspot.com/)

Also suitable for use to grapple fruits such as guava, sawo, lime

Figure 2.6: '*Petai*' Knife,

(Source: http://galahsambung.blogspot.com/)

To grapple '*petai'*.

Figure 2.7: Palm Flower knife

(Source: http://galahsambung.blogspot.com/)

To grapple small palm fruit (tree height not exceeding 3 feet), it is also appropriate use to grapple coconuts.

Figure 2.8: Cutter and Saw for stem

(Source: http://galahsambung.blogspot.com/)

Use to cut *rambutan* stem.

Figure 2.9: Coconut's pull

(Source: http://galahsambung.blogspot.com/)

Use to pull coconuts

Figure 2.10: Knive for '*Petai*' and '*Pinang*'

(Source: http://galahsambung.blogspot.com/)