

Mechanised Rubber Tapping Devices

B. Ramesh, N. M. Krishnakumar, Rahul Ramesh

Abstract: Kerala is the leading State in India for rubber plantations and grows to 92% of the Country's total rubber production. Rubber is an important agricultural plantation, rapidly expanding in to both climatically optimal and suboptimal environmental conditions. Tapping of rubber trees is a skill oriented work and the labors availability in this field is a big problem faced today, which affected the natural rubber productivity in the plantations of Kerala. The unskilled labors cannot be used for traditional method of rubber tapping. This condition warrants the need of a semi-automatic or mechanised rubber tapping machine, which doesn't need labor skill. The present study explains the Designs and other specifications of four Models of mechanised Rubber Tapping Devices

Keywords: Designs and Devices, Mechanised Model, Rubber Tapping

I. INTRODUCTION

The State of Kerala accounts for more than 90 per cent of the rubber production in India. Many industrial units in the country solely depend on rubber and rubber-based products in one way or the other in their process of production. The total area under cultivation of rubber in Kerala is estimated as 5.45 lakh hectares and 11.50 lakh farmers, majority of which are marginal holders, involved in the cultivation of rubber in their homesteads. But it is alarming to note that during recent years the area under cultivation and production of rubber in the State has been on a decline due to several factors.

Although Kerala accounts for the lion-share production of Rubber in India, it is paradoxical to note that almost 89 per cent of area and 93 per cent of the total production of rubber comes under small-holdings sector. These have led to a situation of multiple marginal cultivator dependence on a single tapper. This often lead to delayed tapping which further affects the yield and profit of the growers. Rubber Tapping causes health problems such as medical and musculoskeletal problems and health hazards. It varies from musculoskeletal aches to structural damage and poisoning due to chemicals. In addition to this, as the tapping wages is relatively lower than the wages of other agricultural

and construction workers, tapper absenteeism is a common phenomenon in the State. The tapping process is a tedious and time consuming one, which requires the tapper to start the tapping process in the early morning hours and has to finish it up before sunrise. This often makes it difficult and reluctant for even the skilled women counterparts, to involve in the tapping of rubber trees, which are situated in isolated and uninhabited rubber plantations. Tapping when usually done in the traditional manual way with the tapping knives, often lead to damages to the tree and in turn substantially affects the yield, when they create a much deeper groove on the bark than what is actually required.

All these factors have contributed the to the traditional rubber growers to switch over to other remunerative works and agricultural operations. Many of the existing rubber plantations in Kerala esp. the prime centres of production like Kottayam, Pathanamthitta, Ernakulam and Thrissur, have gradually been converted to the plantation of new generation food crops like Rambutan, Longan fruit, Mangosteen etc. Though several innovative attempts have been made to evolve labour-saving devices and scientific methods of tapping like automatic rubber tapping machine, low frequency rubber tapping technique with the initiative of the Rubber Board, they are proved to be either costly or relatively less effective, to help the marginal farmers. Hence it has been become quite important to develop a low cost easily manageable and less skill requiring devices capable of assisting the marginal rubber growers to revive the rubber plantations and the production of rubber in the State. The sustained research efforts in this regard has led to the development of a low cost easily manageable and less skill-requiring mechanical devices developed by us as detailed as follows. Uniqueness of these inventions are that all the 4 types of prototype devices developed will cost less than Rs. 4000/- and can be operated by any unskilled person regardless of gender differences. Moreover, all these models, when produced on a commercial basis, better ergonomics in design can be achieved which will further reduce the cost of production substantially.

II. DESIGN AND EXPERIMENTAL WORK

The Designs and other specifications of 4 Models of the Mechanised Tapping Devices, all of which run in 12-24 V DC power supply are presented as follows:

Revised Manuscript Received on October 10, 2019

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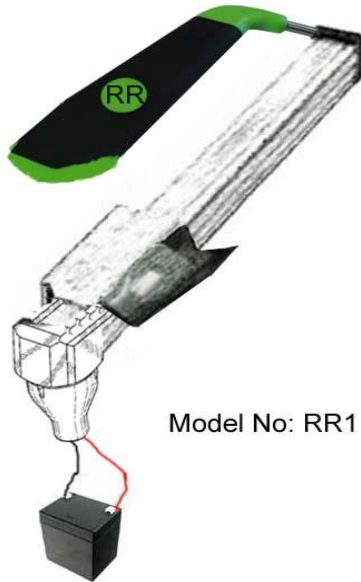
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Mechanised Rubber Tapping Devices

1. MODEL RR1 (12-24V DC)
2. MODEL RR2 (12V DC)
3. MODEL RR3 (12V DC)
4. MODEL RR4 (12V DC)

1. MODEL No. RR1



Model No: RR1



Model No: RR2

Technical and Other Specifications:

Type of Motion	Linear
Supply Voltage	12V DC
LINEAR TRAVEL PER STEP mm	LINEAR TRAVEL PER STEP mm/in 0.03
Cooling Method	Natural Air Cooling
Approx.Weight	1 kg.
Approx Cost	Rs.3000/-

2. MODEL No. RR2

Technical and Other Specifications:

Type of Motion	Linear (Forward and Backward)
Supply Voltage	12-24V DC
LINEAR TRAVEL PER STEP mm	LINEAR TRAVEL PER STEP mm/in 0.03
Cooling Method	Natural Air Cooling
Approximate Weight	1 kg.
Approximate Cost	Rs.1800/-

Key Features:

- Compact design
- Can be operated with ease
- Can be used even by an unskilled person
- Precision cutting
- Integrated LED light facilitates tappers to operate even during night
- Bipolar micro stepping drive with PLC functionality.
- Suitable for charging with AC power supply
- Single DC power supply (12-24V).
- Position & Speed Control.
- Customization possible on connectors, rpm required and covering of the drive.

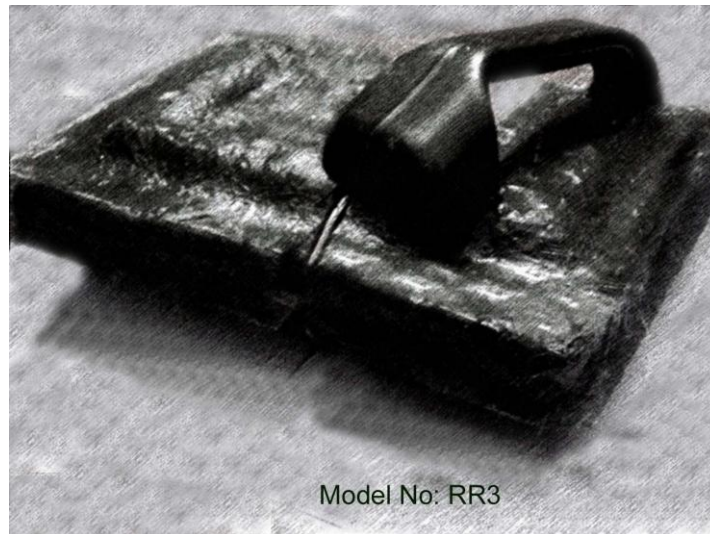
MODEL No. RR2

Key Features:

- Compact design
- Can be operated with ease
- Can be used even by an unskilled person
- Precision cutting
- Integrated LED light facilities tappers to operate even during night
- Bipolar micro stepping drive with PLC functionality.
- Suitable for charging with AC power supply

- Single DC power supply (12V).
- Position & Speed Control.
- Customization possible on connectors, rpm required and covering of the drive.

3. MODEL No. RR3



Model No: RR3

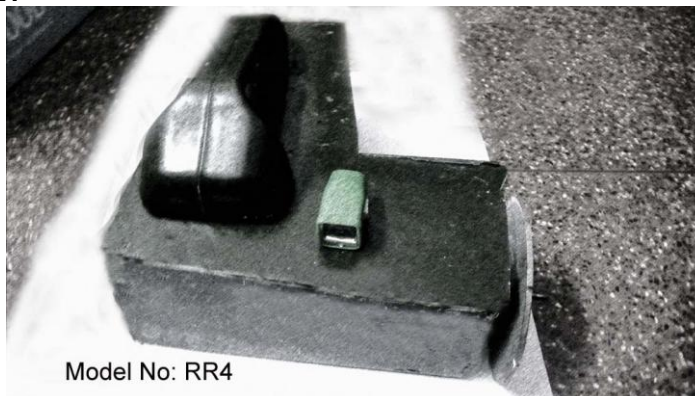
Technical and Other Specifications:

Type of Motion	Rotary
Supply Voltage	12V DC
Cooling Method	Natural Air Cooling
Approx.Weight	1 ½ kg.
Approx Cost	Rs.2100/-

Key Features:

- Compact design
- Can be operated with ease
- Can be used even by an unskilled person
- Precision cutting
- Integrated LED light facilities tappers to operate even during night
- Bipolar micro stepping drive with PLC functionality.
- Built-In Rechargeable battery
- □ Single DC power supply (12V).
- Can work for 4-5 hours without charging
- Position & Speed Control.
- Customization possible on connectors, rpm required and covering of the drive.

4.MODEL No. RR4



Model No: RR4

Technical and Other Specifications:



Mechanised Rubber Tapping Devices

Type of Motion	Linear
Supply Voltage	12V DC
LINEAR TRAVEL PER STEP mm	LINEAR TRAVEL PER STEP mm/in 0.03
Cooling Method	Natural Air Cooling
Approx.Weight	2 kg.(can be reduced considerably when produced commercially by substituting certain materials)
Approx Cost	Rs.3500/-

Key Features:

- Compact design
- Can be operated with ease
- Can be used even by an unskilled person
- Precision cutting
- Integrated LED light facilities tappers to operate even during night
- Bipolar micro stepping drive with PLC functionality.
- Suitable for charging with AC power supply
- Single DC power supply (12V).
- Position & Speed Control.
- Customization possible on connectors, rpm required and covering of the drive.
- Knife attached with LED light

III. CONCLUSION

The present paper describes the designs and other specifications of the four models of mechanised Rubber Tapping Machine, which are low cost, easily manageable and less skill required devices.

REFERENCES

1. Kadavil, Tharian George, 'Tapping Labour Shortage and Dilemmas in Policy Options: The Case of Rubber Smallholder Sector in Kerala', *SSRN Electronic Journal*, January 2012
2. Ramachandran, P., et al. "Evidence for association of a viroid with tapping panel dryness syndrome of rubber (*Hevea brasiliensis*)."
Plant disease 84.10 (2000): 1155-1155.
3. Reddy, V. Devender, B. Santhosh Kumar, and Nazia Uzma. "Lung function parameters, neck pain and associated factors among male rubber tapping workers in Kerala." *Int J Pharm Med & Bio Sc* 1.2 (2012): pp43-8.
4. Viswanathan, P. K., George, K. Tharian and Joseph, Toms. (2000). 'Employment, Working Conditions and Status of Labour in the Unorganised Rubber Smallholdings: A Case Study of Rubber Tappers in Kerala', *Monograph (Draft), Rubber Research Institute of India, Kottayam*, p. 75.
5. Viswanathan, P. K. "Emerging smallholder rubber farming systems in India and Thailand: A comparative economic analysis." *Asian Journal of Agriculture and Development* 5.1362-2016-107697 (2008): pp.1-19.
6. 'SHARP DECLINE IN RUBBER PRODUCTION IN KERALA, OUTPUT DECLINES MORE THAN 15%', *THE ECONOMIC TIMES*, APRIL 2015. DOI: //ECONOMIC TIMES.INDIATIMES.COM/ARTICLESHOW/46984377.CMS?FROM=MDR&UTM_SOURCE=CONTENTOFINTEREST&UTM_MEDIUM=TEXT&UTM_CAMPAIGN=CPPST
7. 'RUBBER TAPPING TAKES A HIT AS RAIN WREAKS HAVOC', *THE HINDU BUSINESS LINE*, JUNE 2018. DOI: [HTTPS://WWW.THEHINDUBUSINESSLINE.COM/NEWS/RUBBER-TAPPING-TAKES-A-HIT-AS-RAIN-WREAKS-HAVOC/ARTICLE24165619.ECE](https://www.thehindubusinessline.com/news/rubber-tapping-takes-a-hit-as-rain-wreaks-havoc/article24165619.ece)
8. 'PLANTATION SECTOR IN DEEP CRISIS: UPASI', *THE ECONOMIC TIMES*, SEPTEMBER 2018, DOI: [//ECONOMICTIMES.INDIATIMES.COM/ARTICLESHOW/66013736.CM](http://ECONOMICTIMES.INDIATIMES.COM/ARTICLESHOW/66013736.CM)

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