

DEVELOPING AN IMPROVED PALM CLIMBING DEVICE*

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ABSTRACT

An attempt was made to develop an improved device for climbing of palms. The device comprises three major parts, namely, (1) Upper clutch around the trunk with handle and with independent clutching mechanism, (2) Lower clutch with platforms for footrest having arrangement for clutching with the trunk and (3) the body with collapsible lever mechanism connecting the top and bottom ring. The device will work on the principle of alternate clutching of upper and lower clutches and lifting of the device with the help of collapsible lever mechanism. The design of the device is described in this paper.

INTRODUCTION

Climbing palms like coconut and arecanut is necessary for harvesting nuts and carrying out hybridization and plant protection measures. By and large, it is done by professional climbers who get trained from their younger days. Since it is a strenuous and risky job, and with the changed socio-cultural outlook, fewer young men are taking it up and this has caused a scarcity of palm climbers. Also the wages demanded for climbing is about Re. 1/- per palm at present.

The need for developing an efficient palm climbing device has been long felt. The research workers are also looking for a reliable device enabling them to reach the crown of the palm (Davis 1961). A few gadgets have been devised for this purpose during the past three decades; but none of them could satisfy all essential requirements. In this paper, a brief account of the gadgets developed so far and the design features of an improved palm climbing device are discussed.

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Earlier Work: Many attempts have been made for devising gadgets for climbing coconut palms. Wickramasuriya (1953) developed a crane type ladder for harvesting coconuts in Sri Lanka. T. A. Davis (1963, 1964, 1968, 1977) developed a palm bicycle which works on the principle of moving a pair of friction rollers pressed to the trunk by the weight of the climber (Cantilever principle). Swamy and Patil (1975) developed a much simpler device which consists of moveable supports for legs and hands, and lifted alternately while the other one is gripped for climbing.

In Jamaica, a Swiss equipment used in forestry for climbing, known as the Baumvelo (tree bicycle), was tried with some modifications for coconuts (Anon. 1976) but problems were faced when leaving the device near the crown of the tree. Sliding aluminium ladders are being used in Jamaica now. A farmer from Kerala, M.J. Joseph (Anon. 1982) had developed a coconut tree climbing device which is similar to the 'Baumvelo' tree bicycle. This device works on the principle of gripping the device through rings by self weight with the legs providing the motive power. At TNAU, Coimbatore also attempts were made towards developing a similar model (Anon. 1981). Dwivedi (1977) has also designed a palm climbing device.

Improvised oval rings have been used for scaling tall forest trees in Czechoslovakia, Poland, Soviet Union and Germany (Davis, 1977). Oil palm in West Africa is climbed by using a waist ring. In Ivory Coast, (Anon. 1963, 1966) for climbing oil palms, spiked boots, and flexible steel cable around the body of the climber and tree, are used.

For climbing palmyrah palms (Anon. 1967) a ladder type device was developed. Later a device with wire rope or cable running over a pulley fixed at the crown with a dead weight connected to one end, was developed for scaling palmyrah palms with ease.

The Present Device: An attempt has been made recently at the Technology Section, CPCRI, Kasaragod to develop an improved palm climbing device.

Design Considerations: The following factors were considered while designing the device.

1. The device should ensure sufficient safety to the climber
2. It shall need low physical effort by the climber.
3. Scientists and growers alike should be able to use it to climb the palm easily with little training.
4. It should be possible to easily and quickly dismantle and carry it from one palm to another by one man.
5. It should be simple and fabricated locally.
6. The cost of the device shall not exceed Rs. 1,000/-.

Concept of Design: The device is expected to perform the following basic operations.

- (i) Aid in climbing up the palm.
- (ii) Hold on to the trunk when left free after reaching the crown.
- (iii) Aid in climbing down.

1. Climbing mechanism: The climbing mechanism shall consist of (i) clutching/gripping arrangement (ii) lifting and lowering arrangement. For the gripping arrangements, there are several possible mechanisms and a few are illustrated in Fig. 1. The wire rope mechanism (Fig. 1A) grips the trunk by tightening of the wire rope around the trunk when pressure is applied on foot rest by body weight of the climber whose hands are free at the time. This mechanism shall work only when the palms are erect. This principle was used in Baumvelo (tree bicycle) in Jamaica and in Joseph's model later in Kerala.

The roller-mechanism (Fig. 1B) ensures the firm gripping of the device to the trunk by a pair of rollers which are held on to the trunk by the weight of the person, on the canti-lever principle. This principle has been tried by T. A. Davis.

The third mechanism (Fig. 1C) provides independent gripping by hands and legs by a spring-loaded lever mechanism. This mechanism has been made use of in the present gadget.

GRIPPING MECHANISMS

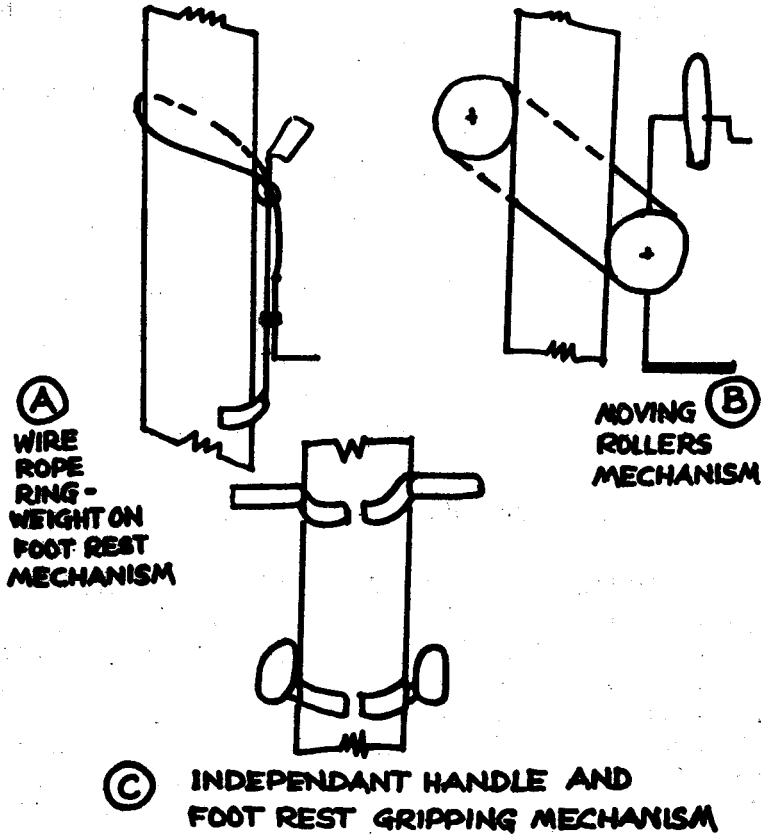


FIGURE 1.

Independent Gripping Mechanism: The gripping mechanism of the device consists of two independent parts, namely upper clutch and lower clutch (Fig. 2). The upper clutch consists of a guide ring with handles to which a pair of curved arms (sector of a ring) fitted with old rubber tyres are hinged with operating levers. The arms are spring-loaded to facilitate quick recoil action. The upper clutch unit can be gripped to the trunk or released from the trunk by pressing or releasing the levers at the handles.

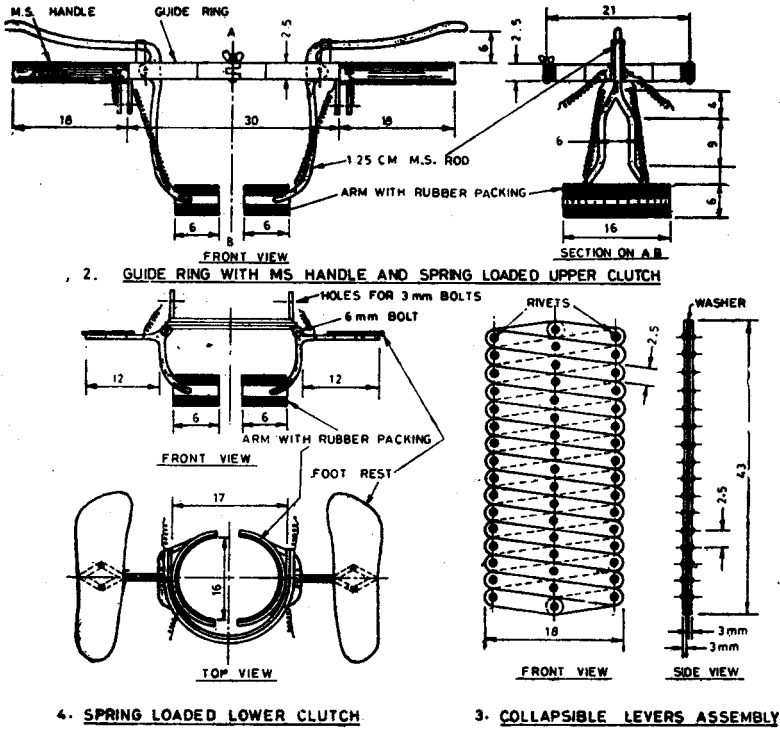


FIG. 2

The lower clutch also similarly consists of a pair of curved arms fitted with rubber tyres. The arms are hinged through spring-loaded levers to foot rests. The weight of the person applies pressure on the foot-rests when the levers get actuated and the arms are gripped to the trunk tightly. The arms are loosened of their grip by releasing the pressure on the foot rests from body weight due to the recoil action of the spring loaded levers. A guide plate connecting the two arms are provided. The upper and lower clutches are to be operated alternately.

Lifting and Lowering Arrangement: Both the arms are connected by a pair of collapsible levers made of aluminium and the collapsible levers aid in lifting the device as well as providing a safety arrangement to the climber.

Safety Arrangement: A safety chain tethered round the waist of the climber and connected to the device and trunk is provided. Apart from this, the collapsible levers also provide safety to some extent.

Operating the Device: The device has to be operated in the following four steps:

(1) *Mounting the device on the palm:* The device is mounted on the palm by opening the guide plate of upper clutch and closing it by bolt and nut. The device is positioned in such a way that the collapsible levers are on opposite sides of the palm.

(2) *Gripping the lower clutch:* The climber mounts on the device by standing on the foot rests and holding the handle of upper clutch. The foot rests are firmly pressed so that the lower arms are tightly gripped to the trunk.

(3) *Raising the upper arm:* Then the upper clutch is loosened and can be raised with ease because of the collapsible levers to a convenient height above the head level. This will provide enough moment or leverage to the climber while lifting himself up. The levers at the handles are pressed to grip the upper arms. Now the climber holds the handles with levers firmly gripping the trunk.

(4) *Releasing the lower clutch grip and lifting up:* The pressure on the foot rest is released by slight loosening and simultaneously the climber gives a slight lift to his body with the help of the leverage at handles. The collapsible levers close up by this action and the climber and the lower clutch get lifted up. The height of lift may vary from 30-70 cm. in each lap depending upon the effort put forth by the climber.

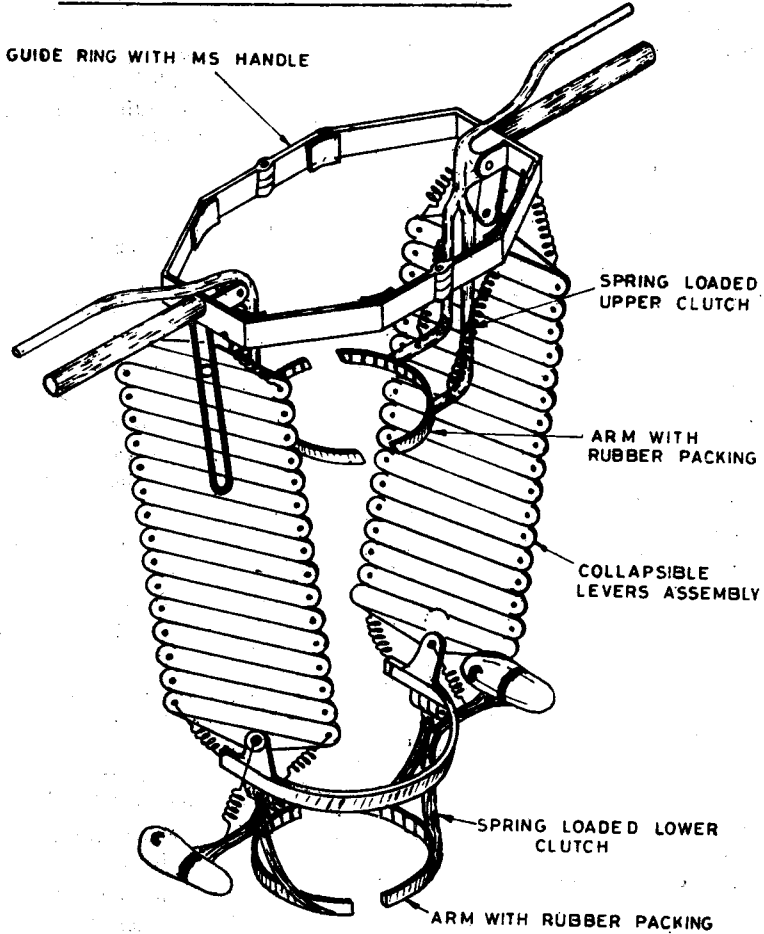
After lifting himself and the lower clutch to a convenient height, the foot rests are pressed again for gripping the lower clutch to the trunk. This completes one lap or one cycle of climbing.

This operation is repeated and the climber can reach the crown of the palm with little effort. The operation has to be reversed while

climbing down. Locking arrangement is provided to enable the fixing of the device at any position on the palm trunk without automatically slipping down.

Prototype Development: The above principles and mechanism

ARECANUT PALM CLIMBING DEVICE



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FIG. 3

have been employed in fabricating a climbing device suitable for arecanut palms (Fig. 3). The performance of the device was found to be satisfactory in the preliminary trials.

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