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THE LOGQUIP SMART ARCH FOR SMALL CRAWLER TRACTORS

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INTRODUCTION

Small 60-70 kW crawler tractors are versatile machines, ideal for thinning moderate to steep terrain. The two main advantages they offer are :

- the ability to push in tracks
- their good climbing ability, particularly in reverse.

One of the limiting factors with these crawlers is the relatively small payload that they can handle.

Pulling directly off the winch provides little lift for the drag and results in high log breakage during extraction. Towing a rubber-tyred sulky improves load capacity but creates manoeuvrability problems and impedes the ability to push in tracks. While the fitting of the integral arch (Ref. 1) enables the log ends to be lifted clear of the ground, it causes the machine to ride on its rear drive sprockets when loaded. This reduces the tractive capacity of the crawler and increases the wear and tear on track components. Drag sizes must also be smaller to prevent the tractor from rearing up. Obviously in this configuration, crawler tractors are unsuitable for uphill extraction.

THE SMART ARCH CONCEPT

Owner-operator, Robbie Linton, began experimenting in 1984 with a different type of arch. This unit has a single castor wheel, and is attached to the rear of the tractor by two pins instead of being towed from the drawbar (see Figure 1).

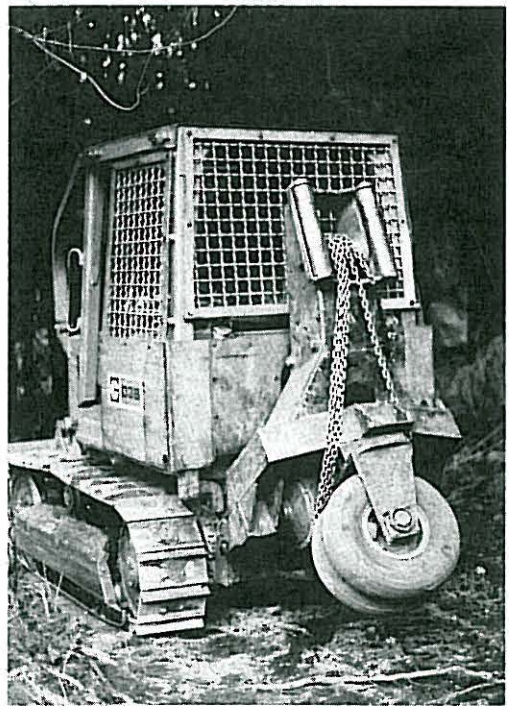

Figure 1 - The Logquip Smart Arch

Because the arch is hinged from the towing points, the bulk of the weight of a drag is carried by the castor wheel, leaving the tractor with the full length of its tracks on the ground. This improves traction and reduces the loading on the rear drive sprockets. When travelling empty, the arch is hoisted up flush against the ROPS canopy of the tractor (refer Figure 2) simply by attaching a strop to a hook on the canopy and winching in on the mainrope.

Ref. 1

Evans, S. "Modifying Small Crawler Tractors for Thinning", LIRA Technical Release, Vol. 6 No. 1 1984.

pulled up by the winchrope. This proved to be both cheap and simple. A grabhook has now been bolted to the canopy and the strop is attached to that for lifting.

DISCUSSION

The Logquip Smart Arch has been working successfully in its prototype form for thirteen months now and, apart from minor wear on pins and bushes and the castor pivot, no signs of damage or deterioration are apparent. While it is too early at this stage to determine the effect of the Smart Arch on track and drive sprocket life, visual observations confirm that there is less wear and tear on these components. The advantages and disadvantages of the Smart Arch are listed below :

Advantages

(1) Load capacity is greater than with an integral arch or pulling directly off the winch.

(2) Machine manoeuvrability is unimpaired with the arch raised.

(3) Cycle time is reduced because of ability to back straight up to each drag.

(4) Climbing ability of the machine in reverse is improved because the raised arch acts as a counterweight.

(5) There is good weight distribution over the full length of the tracks when travelling loaded, resulting in longer track life.

(6) Reduced winching is necessary when travelling loaded, particularly during flat ground or uphill extraction. Hence there is less winch and rope wear.

(7) Tree damage is reduced because of better log control when side pulling, etc.

(8) Machine readily available for other uses.

Disadvantages

(1) The Smart Arch is a minor hindrance when climbing from flat ground on to a sharp incline.

(2) Caution is required when reversing with the arch down as it can drop into a hole and fold under the tractor.

(3) Forward climbing ability is restricted compared with no arch or an integral arch.

This simple idea has worked extremely well, with surprisingly few problems for a first-up prototype.

LIRA COMMENT

A production study has been made of the Logquip Smart Arch and a LIRA Brief Report is in preparation.

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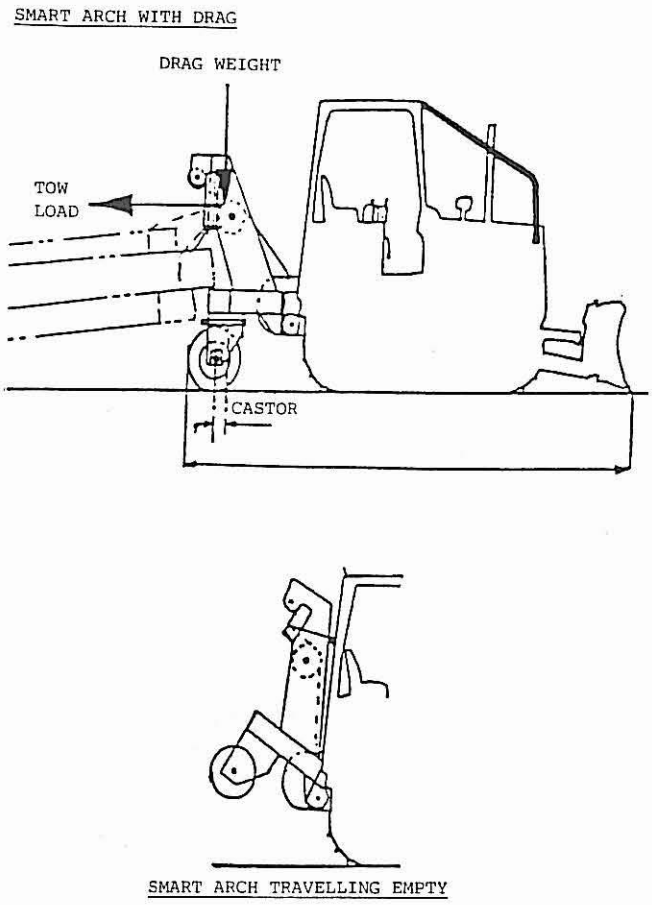

Figure 2 - The Smart Arch in loaded and travel positions

SPECIFICATIONS

Basic specifications for the Logquip Smart Arch are :

Dimensions

Height to top of fairlead - 2.00 m
Height to top of fairlead roller - 1.70 m
Width - 1.10 m
Length to back of frame - 1.25 m
Weight - 570 kg

Castor wheel mechanism - 360° rotation

Pivot point - high tensile steel axle in molybush thrust bearing

Tyres - two 24 x 7 - 14 pr on a single wheel hub

Recommended machine size 50 - 70 kW

Cost $9,765 (as at 1 March 1986)

MODIFICATIONS REQUIRED

The basic concept of the Smart Arch has been successful right from the prototype stage. The few modifications necessary have only entailed changing minor details for strength or operational reasons.

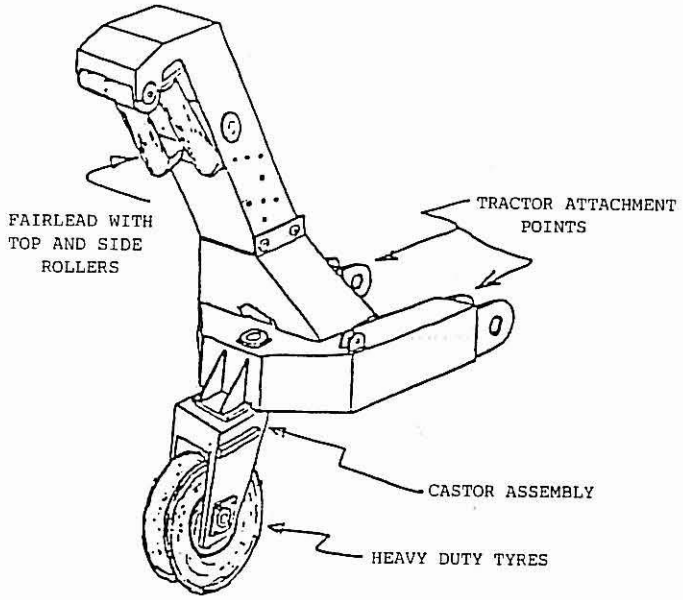

Figure 3 - A pen drawing of the Smart Arch

The main problems have been :

(1) Tyres

Finding suitable tyres has proven to be difficult. After much experimentation the prototype was fitted with dual aircraft tyres which have been the most reliable so far. Future units will be equipped with forklift tyres of equivalent size and strength. These tyres will have a tread pattern which should improve travel over slash.

(2) Castor Assembly

Minor structural changes had to be made to improve the strength of the castor pivot. The current design has lasted well.

(3) Fairlead

A top roller has recently been added to the original Timberjack fairlead to stop the rope from chafing when it comes in contact with the top of the arch.

(4) Arch Hoist

A number of ideas were tried to lift the arch when empty. Initially, a small hydraulic cylinder was used but with limited success. It was replaced by an electric boat trailer winch but again this didn't work particularly well. Finally, almost in desperation, a chain strop was wrapped around the ROPS canopy on the tractor and the arch