Transportation of Pulpwood By Wire Skidding

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The demand for pulpwood to feed the developing pulp and paper industry in the country is steadily increasing. Plantation of pulpwood species, on extensive forest areas are being raised to produce more and more pulpwood. In addition to these plantations large areas of coniferous forests have also been allotted or kept in view to meet the growing demand of the industry for long fibred material. But nothing has been done to improve upon the conventional pulpwood harvesting methods which are very wasteful and expensive.

Most of the Himalayan coniferous forests are not opened up with roads. The off-road transportation of pulpwood billets, from these forests to the haul roads or waterways is done mainly by 'head-portage' by using man-power. Using of mules and poneys for this purpose is also not uncommon. In fact, the conventional methods used for the off-road transportation of pulpwood are strenuous to the labour, expensive and time consuming for the industry.

With a view to find out a better and more economical method for the off-road transportation of pulpwood, from the hill forests, "Koroleff wire Skidding" method has been tried at several places with successes. In this article economics of the "Wire Skidding" for down hill transportation of pulpwood billets has been worked out after collecting the field data from one of the Chir-pine forests of West Almora Forest Division (U.P.). The results obtained are very encouraging.

Introduction

"Wire Skidding" provides a simple, inexpensive and an efficient method for the transportation of pulpwood and firewood billets in the hills, by gravity, over a suspended wire. This method was developed by A. Koroloff, a practical forester, when he was working with Pulp and Paper Research Institute of Canada, at Montreal, during the year 1954. Mr. Koroloff had a chance to visit India as a FAO Logging export during 1955. His services were invited to find out ways and means of reducing the huge wastage of timber which was involved in the conventional Logging practices, especially in the Himalayan forests.

In addition to his useful recommendations which were made for imporving the Logging methods, in the interest of better timber utilization in the country, and reducing the Logging costs, Koroleff suggested the use of "wire Skidding" for the town hill transportations of wool. A set of "Koroleff's Wire Skidding" equipment was donated by the FAO on the recommendation of the Logging expert.

This equiment has already been tried over several spans upto about 300 meters in length in the hills. It works very well when the slope, between the top and the down stations, falls between 20% and 80%.

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Description of wire skidding equipment
Wire skidding equipment consists of:

(a) A Steel Wire (8 S.W.G)
(b) Tensioning device - Lugall Winch-hoist
(c) Wire grip
(d) Choker rope
(e) Wooden load carriers
(f) Slings
(g) Unservicable motor tyres or a stop-device.

(a) *Steel wire* (8 S.W.G.)

A steel wire is stretched between the loading and unloading stations by anchoring its ends with living trees. A telephone wire, with required tensile strength, can also serve the purpose. It should be strong enough to carry about one quintal load having a breaking strength of about 2 tons.

(b) *Tensioning device.*

Lugall winch-hoist is genrally used to give proper tension to the steel wire anchored between the top and the down stations. Its weight is about 7 Kg. A pull of 1 to 2 tons can be obtained by working the lever which operates this small winch. It is shown in fig.1. A Max-pull or a Cable puller can also be used for this purpose.

(c) *Wire-grip.*

Wire grip is used to give strong and perfect hold of the steel wire to the tensioning device at the top station. Several types of the wire

grips have been used in wireskidding. The grip which has been used in the experiment was made locally and is shown in fig.2.

(d) *Choker rope.*

The Choker rope is used for anchoring the tensioning device to a tree at the top station. The choker rope should be strong enough to hold the tensioining device when in operation.

(e) *Wooden load carrier.*

The design of wooden load carrier is shown in fig.3. In this experiment wooden carriers made of Sal (Shorea-robusta) were used. These carriers should be made of hard and well seasoned wood to avoid split and wearing out when carrying the load.

(f) *Sling*

It is a flexible wire used for tying the load. In this experiment sling wire of 15 gauge has been used for fastening the loads. A single sling can be used for a light weight. The sling are cut to a suitable size well in advance, Sling wire can be twisted by hand for fastening it with the loads.

(g) Unserviceable motor tyres or a stopping device

At the unloading station, the steel wire is anchored by taking it round a tree and then fixing it with the help of a clamp or a spike. One or two old tyres are kept in position in front of the down anchorage to take the impact of the load.

An improved "stopping device" which has been developed in the Logging Branch can also be used in place of the old tyres.

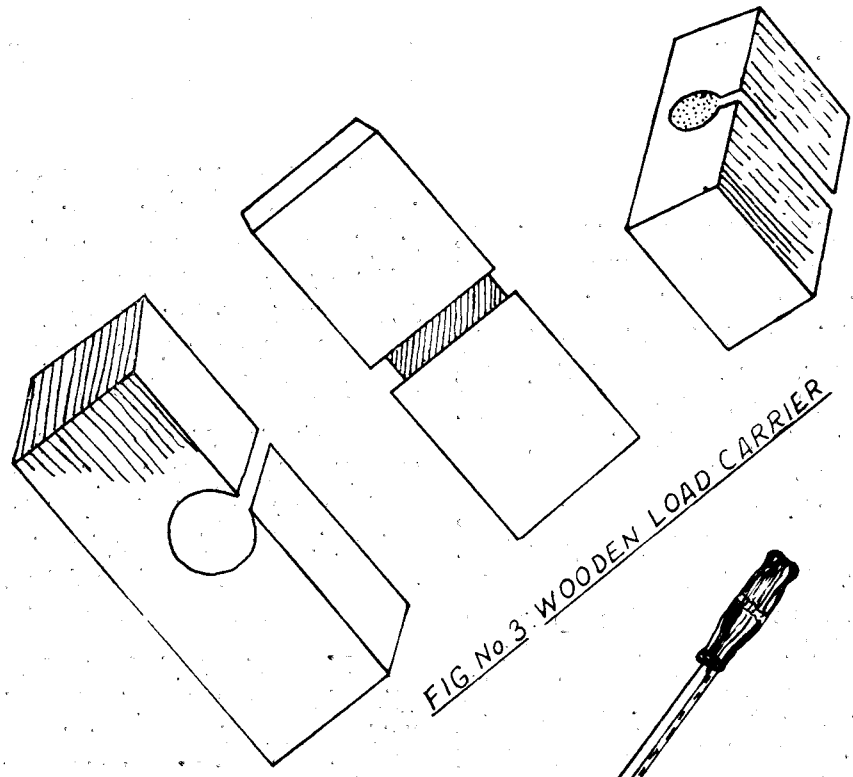

FIG. No. 3 WOODEN LOAD CARRIER

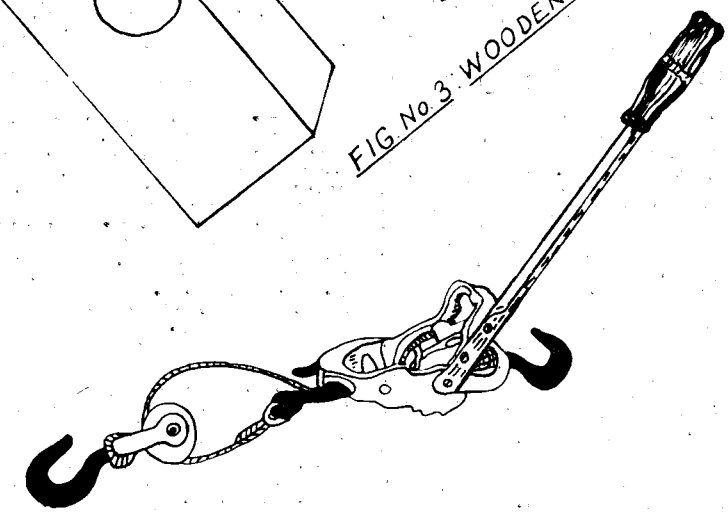

FIG. No. 1: LUG-ALL WINCH HOIST

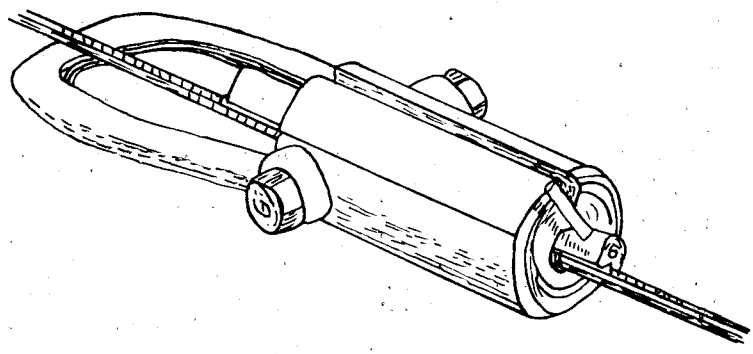

FIG. No. 2: WIRE GRIP

Installation and working technique of wire skidding equipment.

The steel wire is stretched between the top (loading point) and the bottom (unloading point) stations. The line between the top and the bottom stations is clearly marked. There should be no obstruction to hinder the movement of the load. The Lugall a winch-hoist is fastened with the help of a chocker rope to the upper anchorage. The steel wire grip is firmly fixed with the steel wire and then to the Lugall winch-hoist.

At the lower station the steel wire is passed through one or two unservice able tyres and taken round a tree making its enchorage at the unloading station. The free and of the wire is fixed with the help of spikes or wire clamps.

The required tension is provided to the steel wire with the help of the Lugall winch-hoist. Now it is ready to carry the load. The load is tied by using a piece of the sling wire which ends in a loop for hanging the load on the wooden carrier. The load is then hanged on the wooden carrier which is placed on the steel wire and then allowed be slip along the Wire under the pull of gravity. As soon as the wooden carrier with the load is allowed to move on the steel wire it runs down with a tremendous speed to reach the down station. There it strikes against the tyres and thrown away from the steel wire resulting in an automatic unloading of the pulpwood load. The wooden carriers thus sent down with the loads are collected and brought to the loading point to carry more loads till they gets worn out or cracked. Sufficient number of wood carriers (say about 500) should be available at the loading station when the work is in progress.

Precautions

(1) Avoid formation of kinks in the steel wire. At the time of tensioning, the wire will break if there is any kinks.

(2) When the skidding is in progress no one should be allowed to come under the steel wire because the load may fly off the wire and cause an accident.

(3) The workers should stand at a safe distance from the bottom station to avoid hitting of the load to them at the time of its discharge.

(4) The man at the loading point should give a clear signal before relasing the first load.

(5) Proper tension should be given to the steel wire.

(6) For proper maintenance of the steel wire a cloth soaked with mobil oil should be sent down along with the wooden carrier carrying the last load to provide lubrication of the steel wire.

(7) During slack season the equipment should be kept at a dry place, after providing proper lubrication to the steel wire.

(8) It will prove advantageous if tension of the steel wire is released at the end of the day's work to maintain its tensible property.

Layout of the experiment

The experiment was conducted in a Pine Forest, at Totashilling, of W. Almora Division (U.P.). The area under operation was leased out to Star Paper Mills Ltd., Saharanpur, for extraction of twisted chir for paper pulp. The trees were felled and logged in about one meter length. Some of the logs were to be split up into two or more pieces for manual transport upto the top station. The weight of one such log or a price thereof was about 40 to 60 kg. Before introducing the wire skidding the pulp-wood logs were to be transported downhill by manual labour to the motor road which was about two Km from the top station. Four spans for wire skidding were erected to bring the material to the road side. In fact, for this distance only two spans would have been quite enough, but the terrain was not suitable for two spans due to the following main reasons:

1. The material was lying at several places which could not be brought to two loading points.
2. Due to humps there were many obstructions.
3. The slope was also more than 80%.

It was under the above mentioned conditions that four spans of different length and gradients were installed to bring the timber down to the motor road.

Work study

For working out the economics of the "Wire skidding" method for down hiill transportation of pulpwood under Indian conditions "Time & Work Study" was conducted. Time was recorded for the following work elements.

T_1—Average time taken for fixing the sling with the load.

T_2—Average time taken for lifting the load with the wooden carrier and placing it on the steel wire.

T_3—Average time taken by the load to reach the down station.

T_4—Unproductive time.

T —Total time.

Time-involved in installation and dismanteling of the equipment has not been taken into account. It generally takes two to three hours to complete installation of one span. Only about 4 labourers are sufficient to do this work. However this cost has been added to the total cost of skidding.

The distribution of time spent for different elements for all the four spans is given in the following table:

TABLE I

Span No.	Slope	%Length of span in metres	T minutes	T minutes	T minutes	T mibutes	T minutes
1.	70	100	0.26	0.16	0.22	0.50	0.94
2.	65	110	0.3%	0.14	0.23	0.35	1.04
3.	50	130	0.45	0.15	0.2×	0.36	1.14
4.	40	150	0.36	0.16	0.3%	0.34	1.1%

Total number of readings taken for each span =51 Kg.

Average load carried =51 per trip

Cost calculations

I. Fixed cost

Cost of the equipment (one span) Rs. 1250.00

Life of the equipment 2 years

Working hours/year 1200 hours

Scrap value of the equipment Rs. 250.00

Average Annual Cost= $\frac{(I-R)(N+1)}{2N+R}$

When:

I —Investment

R—Scrap value of the equipment at the end of its life.

N—Life of the equipment in years.

AAC —(1250-250) (2+1) 2×2+250
—750 250
—Rs. 1000.00

	Rs.
(a) Interest on AAC 10% @	100.00
(b) Depreciation(I—R)	500.00
Tearly fixed cost(a b)	600.00
Working days in a year 200 days	
Fixed cost/day 600 300	

II Variable cost

(a) Average cost of installation of one span when it is erected to transport a small quantity (say about 500 quintals) of pulpwood comes to about one paise/trip. When the quantity of pulp wood available at one loading point is more than1000 quintals then the cost of installation becomes negligible. Here it is taken @1 NP/trip for 315 trips per day. 3.15

	Rs.
(b) Cost of wooden carriers and slings required for one day (315 trips) @ 4 NP trip.	12.60
(c) Labour charges for four persons @ Rs. 5/- per head per day.	20.00
(d) Miscellaneous	1.25
Variable cost/day	37.00

Total skidding cost/day

I = Rs. 3.00

II = Rs. 37.00

Total Rs. 40.00

Skidding cost per quintal

(a) Average number of trips over a span of 130M with 50% slope taking six hours per day as effective time (see Table I) we get.

$\frac{6\times60}{1}$ =315.7 say 315 trips/day.

(b) Average load carried/trip—51kg

(c) Total quantity of pulpwood transported in one day:

315×51=16065 Kg.

or =160.65 quintals

=say 160 Quintals.

∴ Skidding cost/quintal per span of 130M= $\frac{40.00}{160.00}$

=Rs. 0.25

The above span covered at disance of about 520M of a Mulc-path, which would otherwise be traversed by head portage. The firm (Star Paper Mills) used to pay about 60 NP per quineal for this very distance for the transportation of q pulpwood, before wire skidding was introduced.

Conclusion

1. "Wire Skidding" will prove a very simple and efficient method for transportation of pulpwood on hill slopes, under Indian conditions.

2. The equipment used in the 'Wire Skidding' method is simple and inexpensive. It could be fabircated in the country without any difficulty.

3. No skilled labour is required to operate the wire skidding equipment. An ordinary unskilled labourer can be trained to operate the equipment in a few hours.

4. 'Wire Skidding' is more economical as compared to any other conventional methods which would be adopted for the transportation of pulpwood on hill slopes. The cost of transportations of pulpwood by 'wire skidding' has been reduced to less than half (25 NP against 60 NP per quintal.) as compared to the conventional methods of transporting the pulpwood over the same distance and under the same conditions.

5. 'Wire Skidding' would also reduce the requirement of labour. On an average a forest labourer would transport about 8 quintals of pulpwood by head portage over a distance which would be covered by one span of about 130m with 50% slope, in one day. For transporting 160 quintals per day about twenty labourers would be required. The wire skidding would reduce the requirement of labour to about 1/5th (4 persons against 20) .

It is, therefore, recommended that "Wire Skidding" should be adopted on a large scale especially for the transportation of pulpwood and firewood on hill slopes to increase the efficienc yof the transportation units and reduce the logging costs.

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