

The Kingslaw Bark Peeling Machine

Description

This machine is designed for the purpose of peeling pit props and pulp wood. It is fully mobile since it is mounted on a 2 wheeled trailer which can be towed by a wheeled tractor or a vehicle of the Land Rover type. Weight of complete machine and trailer = 24 cwt.

The general layout of the machine consists of four long feed rollers which revolve the prop and feed it forward to two rotors each of which consists of a helical toothed member and a cutter. The rotors are pressed by spring tension against the prop and the helical teeth peel off the bark whilst the cutter blades (which are set to give $\frac{1}{16}$ inch clearance) only come into action to plane down any knots or other high spots. There is a trip gear to prevent the rotors coming into action until the leading end of the prop is clear of the feed rollers. Pressure on the rotors is adjustable. The power unit is a 10 h.p. twin cylinder air cooled Petter diesel engine which drives by belt and chains through a 4 speed Albion gearbox to the four feed rollers. A separate drive is taken to the two debarking rotors. The gearbox provides four different feed speeds by changing the speed of the feed rollers. A fan extracts the peeled bark and blows it out at the side of the machine. Photographs attached to this report give views of the machine both static and in action.

The price of the machine is £1185 and the makers are Mebro Ltd., Station Road, Buckhaven, Fife, Scotland.

Conditions of the trial.

1. The trial was carried out in December so the sap was down and the bark in the most difficult state for removal.
2. The operators were ordinary forest workers who had only had a few hours practice on the machine.
3. The trial included 7 hours 50 minutes actual running time in a fixed position in the Brandon depot. Although some of the actual tests only occupied a few minutes on a particular size, several tests were run consecutively without stopping except to change gear and alter the pressure adjustment on the rotors (10-15 seconds).

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(2) Mr. McRichardson ^{13/11}

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All the tests were carried out on props of standard sizes which had been felled and cross cut within 14 days of the commencement of the trial. The props were generally of good quality being straight and well snedded. In every case where the bark had not been removed to a satisfactory standard the prop was put through the machine a second time before it was credited to the total peeled in that particular test. Small patches of bark in the region of knots were accepted as they would almost certainly fall during seasoning.

5. A team of 3 men was found to be the optimum number in the operating team i.e. one man picking up the props, one man feeding the machine and one man receiving the props from the machine. No account was taken of stacking after peeling.

Observations

1. Details of the nature and the results of each of the fourteen individual tests are given in appendix i to this report. It will be seen that the trial covered nine different sizes and five different species.

2. Output varied between 37 and 117 cu. ft. per hour. The best output was achieved on 4' x 4" props. Below 4' inches diameter there was a marked falling off in output.

3. Operating costs can be assessed as follows:-

Depreciation on £1185 over 5,000 hours = 4/9d per hour

Repairs and maintenance (estimated) = 4/6 " "

Fuel and lubricants = 7/7 " "

Total machine costs = 6/10 " "

Wages of 3 men at 3/6d per hour +

40% for overheads = 14/8 per hour

Therefore total operating cost = 21/6 per hour

The wide variation in output on the different species and sizes as shown at Appendix i results in widely different peeling costs per cu ft. of output ranging from 2.2d for the 4' x 4 1/2" Corsican Pine peeled at a rate of 117 cu. ft. per hour on Test No. 7 to 7d for the 2 1/2' x 2 1/2" Corsican Pine and 3' x 3" Sitka Spruce peeled at 37 cu. ft.

per hour on Tests 11 and 12. Costs for any output rate can be read from the graph at Appendix ii

4. Fuel consumption taken over the full period of the trial was 3 pints per hour.
5. The standard of peeling was very high except in the case of Sitka Spruce which showed considerable surface damage on many of the props but it should be noted that the trial took place at a very unfavourable time of the year for bark peeling. European Larch required nearly all the props to be put through the machine twice to achieve a sufficient standard of peeling.
6. The best peeling is achieved on straight props but slight bends up to a direction change of 5° can be tolerated. There was no loss in diameter owing to timber being machined off.

The maximum length that the machine will conveniently handle is 10 feet and the minimum length is $1\frac{1}{2}$ feet. The maximum diameter which can be handled is about 6 inches allowing for local whorls up to 8 inches and the minimum diameter is $2\frac{1}{2}$ inches.

7. Daily maintenance consists of lubrication of about twelve points with an oilcan, honing the rotor knives and wiping clean the trip gear which may be affected by an accumulation of resin. Time required is about 20 minutes.

Weekly maintenance consists of the lubrication of ten points with a grease gun and lubrication of the driving chains, adjustment of main belt etc. Time required is about one hour.

The rotor blades require resetting every 3 weeks and the debarking rotors require replacement after 6 weeks intensive running.

8. The only involuntary stops during the trial were:-
 - (a) One stop of 4 minutes due to a prop jamming in the feed tunnel owing to being over 9 inches diameter across a whorl.
 - (b) One stop of 5 minutes to clear a prop which had got onto the reverse side of one of the rotors owing to an excessive bend in the prop.

Observations (c) Twelve cases of a prop entering the rotors too soon and having
(cont'd) the leading end sharpened. This was due to a following prop entering the cutter before the trip gear had time to operate after the preceding prop. This was the fault of the feeding operator and only caused a few seconds delay each time. Ten of these cases were on the first day of the trial when the operators were not fully experienced.

No mechanical defects occurred.

9. Mobility. The time required to get the machine on the move taken from the time that the last prop is ejected until the machine moves off towed by a tractor was found to be 1 minute 30 seconds. The time required on arrival at a new site taken from the machine stopping until the machine was in full production was 1 minute 40 seconds. For short moves within a depot 3 men can move the machine by hand on reasonably flat ground.

Tests to prove the stability of the machine when being towed by a tractor on roads and forest rides were very satisfactory. Although not actually tested there is no reason to doubt that on main roads a Land Rover could pull the machine at 20-30 m.p.h.

Conclusions

1. The Kingslaw machine has shown that it is able to peel the standard sizes of pit props and pulp wood very successfully.
2. The trial results were satisfactory both as regards peeling costs and the standard of peeling though some further evidence is required on the standard of finish on Spruce.
3. The ease with which the machine can be moved from site to site would be of particular value in some applications.

R. G. SHAW
Machinery Research Officer
December, 1955.

The Kingslaw Bark Peeling Machine - Detailed results of a trial at Brandon

7-9 December, 1955

Test No.	Species	Size	Gear used	No. of Props peeled	Time	Lineal feet per hour	Cubic feet per hour	Cost per cu. ft. pence	
1	Scots Pine	3x3	4th	888	2 hours	1332	59	4.4	Size not in Smiths tables Surface torn Nearly all were put through twice.
2	"	3x3	4th	363	45 mins	1452	64	4.0	
3	Corsican Pine	5½x5½	2nd	67	30 mins	737	110	2.3	
4	"	3½x3½	4th	195	30 mins	1365	82	3.1	
5	"	3½x3½	4th	177	25 mins	1487	90	2.9	
6	"	3x4	4th	256	35 mins	1317	100	2.6	
7	"	4x4½	3rd	159	32 mins	1192	117	2.2	
8	Scots Pine	3x3	4th	250	33 mins	1362	60	4.3	
9	Corsican Pine	5x5	2nd	74	24 mins	925	114	2.3	
10	"	1½x3	4th	73	8 mins	821	-	-	
11	"	2½x2½	4th	248	31 mins	1200	37	7.0	
12	Sitka Spruce	3x3	4th	121	26 mins	838	37	7.0	
13	Douglas Fir	3x3	3rd	51	9 mins	1020	45	5.7	
14	E. Larch	6½x4" -5"	2nd	26	22 mins	461	49	5.3	

Note: In quoting sizes the first figure refers to length in feet and the second to diameter in inches

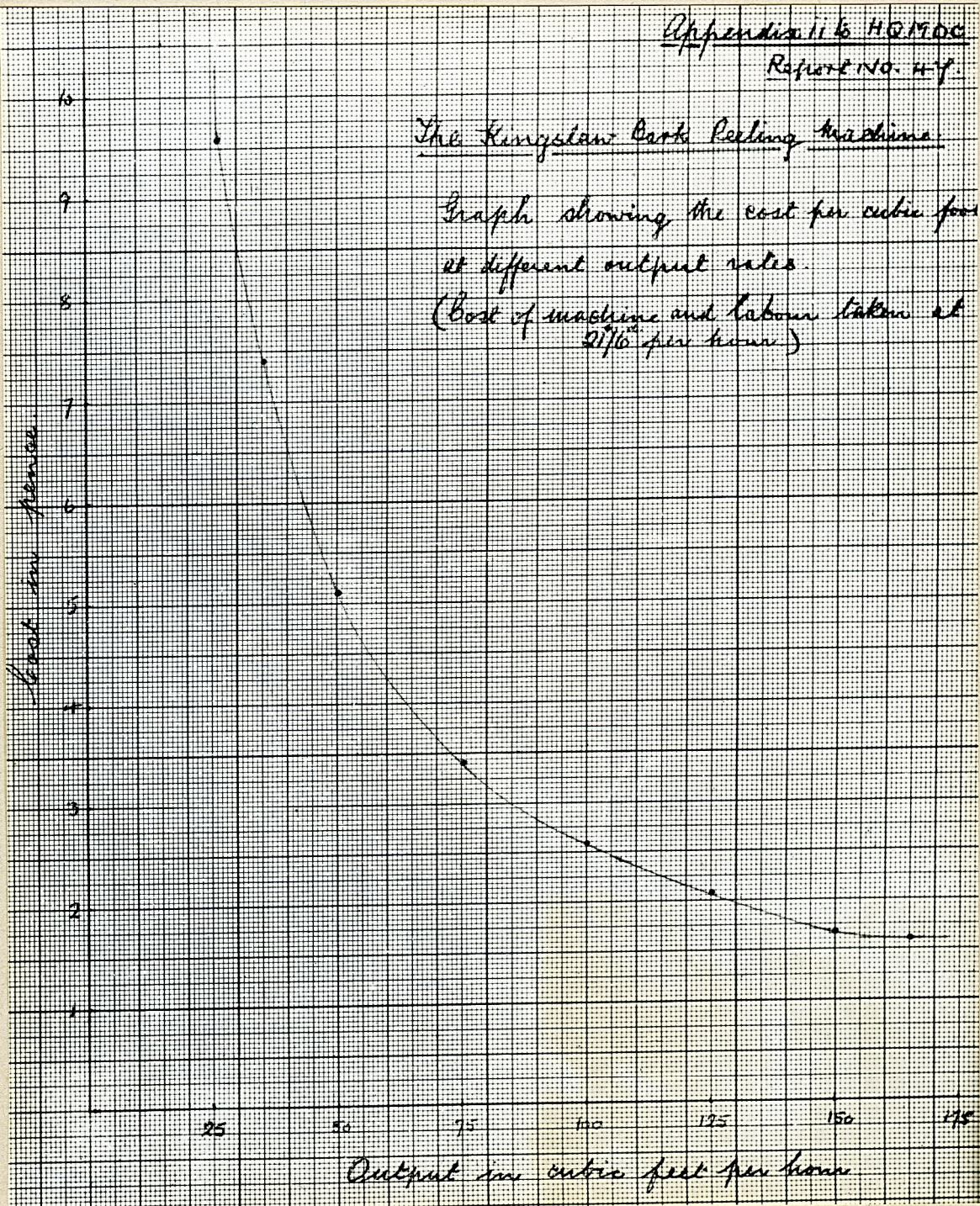
Appendix 1 to HQ 1900

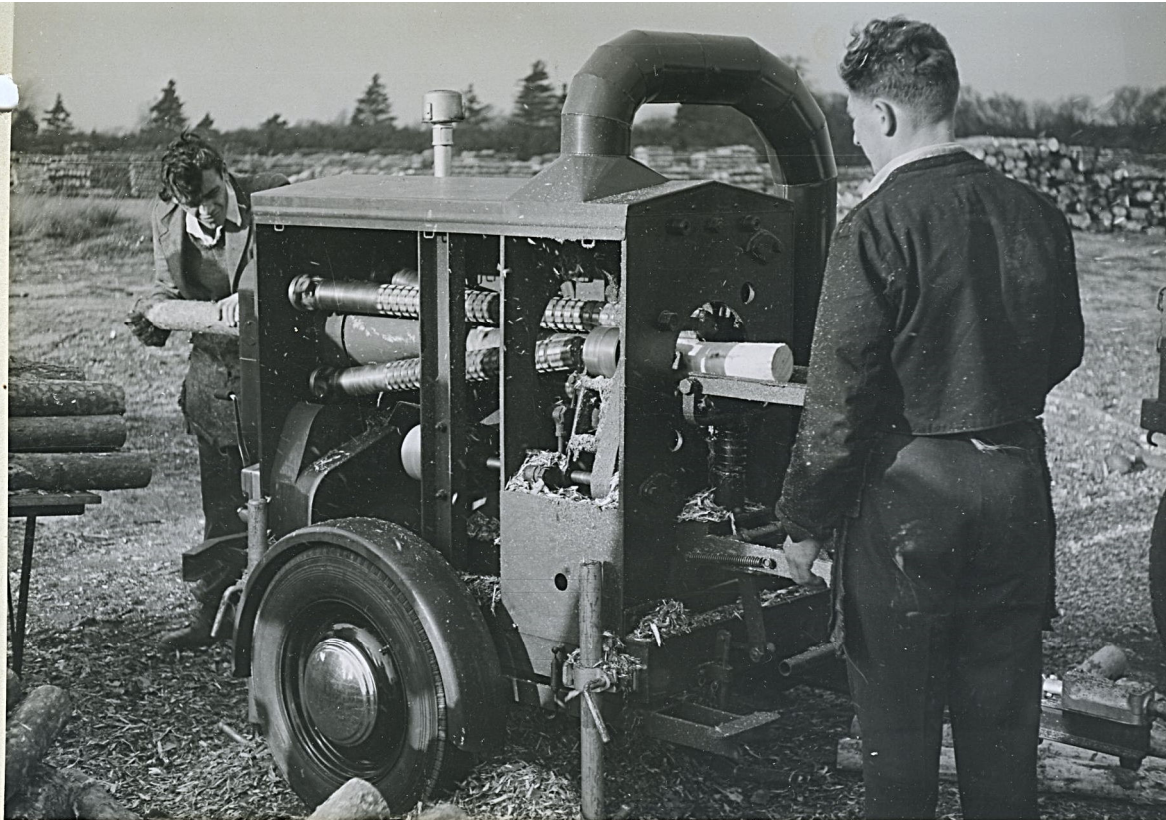
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The Kingston Carts Peeling Machine

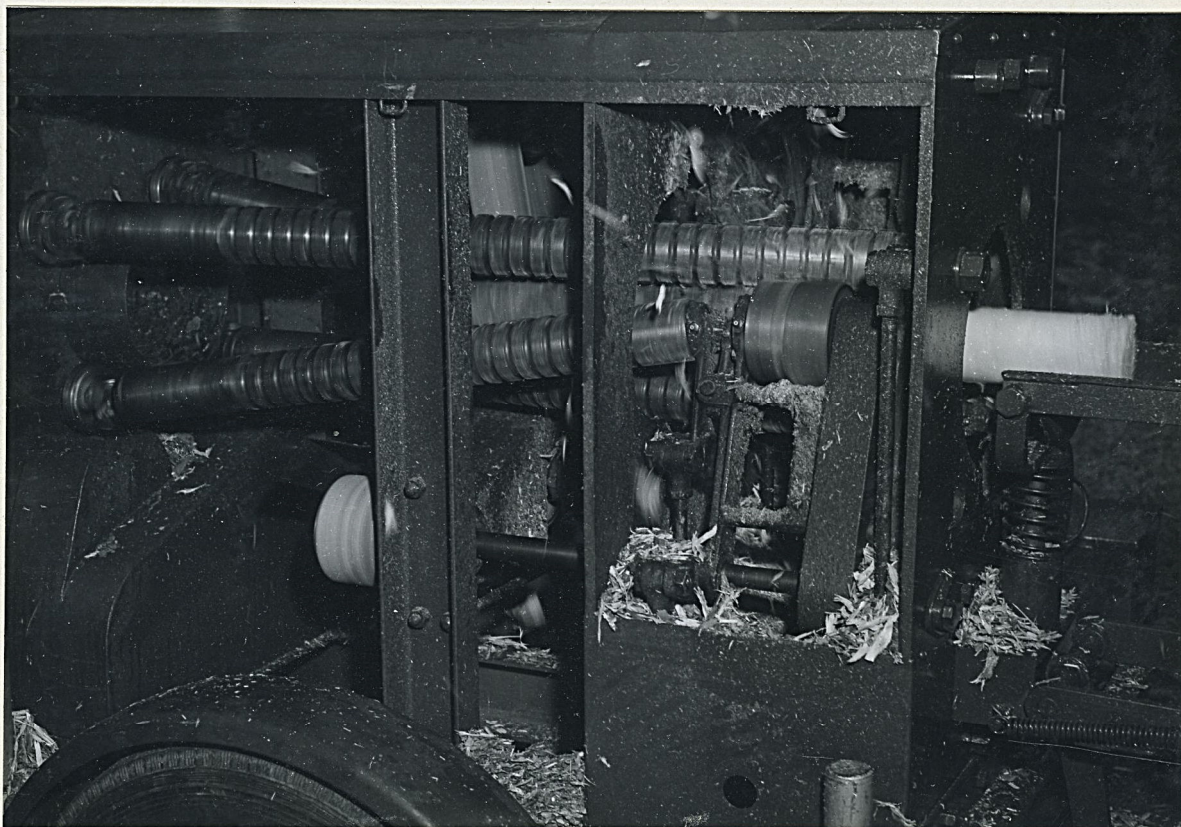
Graph showing the cost per cubic foot
at different output rates.

(Cost of machine and labour taken at
21/6⁰⁰ per hour.)

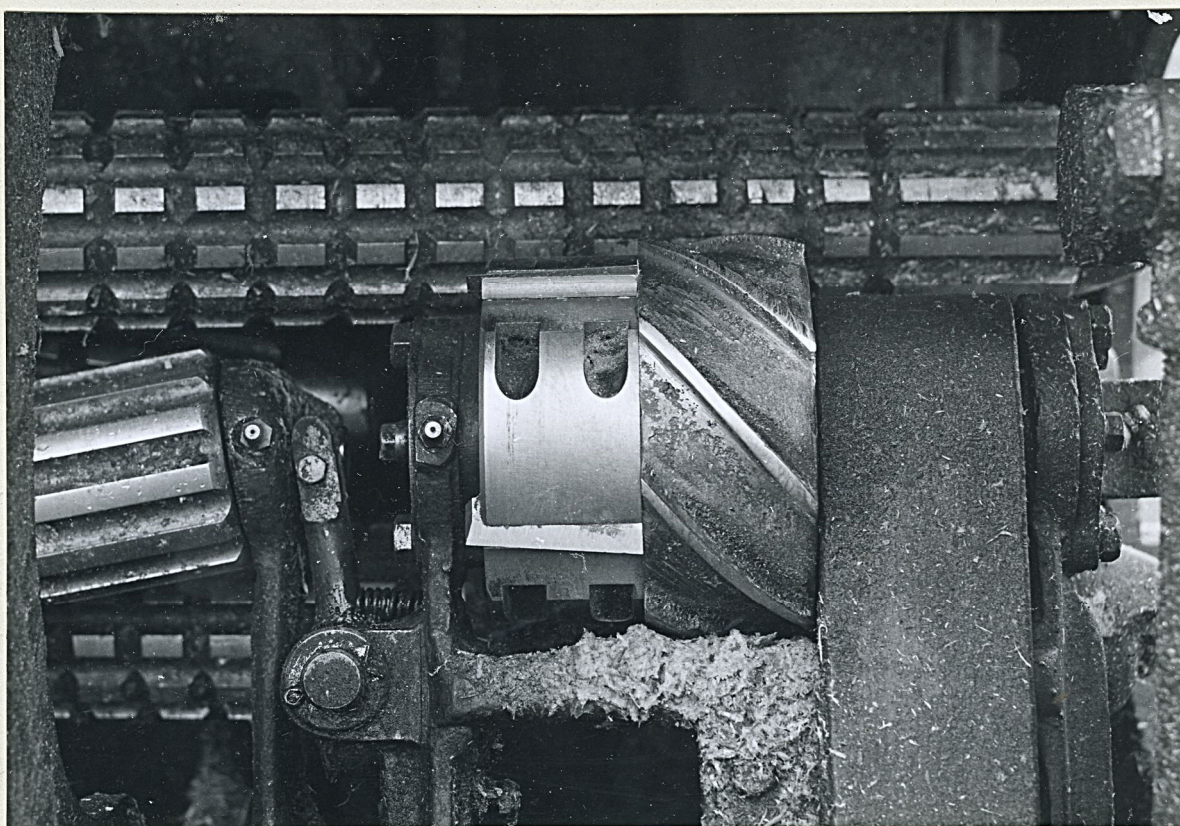




1. A general view of the Kingslaw machine in operation. The man on the left is feeding a prop into the machine and the man on the right is waiting to receive the prop already passing through the machine.



2. A close up view of a pit prop passing through the machine. The four long feed rollers rotate the prop and propel it through the debarking rotors and cutters (one of which is seen at the right hand end of the rollers.) The bark is extracted by a fan on the far side of the machine.



3. A close up view of one of the combined debarking rotors and cutters (a second similar unit is on the other side of the machine). The knives of the cutter are set $\frac{1}{16}$ of an inch below the helical debarking teeth of the rotor so that they only come into contact on knots or whorls.