

Capt. Long ~~to~~ ^{to}
Mr. Wadsworth
Mr. Maxwell. MM

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It is clear that much improve-
ment in detail is still required

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Report No.13Second Prototype Power Operated RopewayOrigin

The first prototype ropeway was covered by H.Q. MDC Report No.3. where it was shown that a considerable improvement could be made if certain items of the equipment were reduced in weight to simplify erection.

Description

The second prototype ropeway was produced on similar lines to the first but including the following main changes:-

- (a) The main cable reduced from $\frac{3}{4}$ " diam. to 15 MM (under $\frac{5}{8}$ " diam. (a reduction in weight of 111 lbs. per 100 yds. of cable).
- (b) Provision of a main cable drum with winding gear and mounted on road wheels for easy handling.
- (c) An entirely redesigned winch of tubular construction employing a 350 c.c. J.A.P. air cooled engine, 4 speed Albion gearbox and auxiliary high/low gear range. Maximum pull in bottom gear and low range is 2000 lbs. A winding rope of $\frac{1}{4}$ " diam. is used and the whole winch can be lifted by two men.
- (d) A Standard Trewhella winch is now used for tensioning the main cable in conjunction with standard War Office pattern Holdfasts.
- (e) A Specification for a 600 yds. ropeway is given at Appendix A.

Photographs of the winch and the main cable drum with some general views are attached to this report at Appendix B.

Observations

(1)

Erection

A ropeway to this design has been erected and dismantled on a number of occasions and the importance of keeping the weight of the components as low as possible has been amply demonstrated.

There is some difference of opinion on the number of men required in the team for both erecting and operating but it is either four or five so calculation in this report will be based on the latter figure.

A feature that has been clearly shown is that a trained team will complete an erection in a fraction of the time taken by inexperienced men. The fastest time recorded by a team working in easy conditions was 2 days but at the other end of the scale 7 days has been recorded by inexperienced men. Such variations in erecting time have an overwhelming effect on total extraction cost where the volume extracted from a site is as low as 2000 cu.ft. as is often the case.

An example based on 2000 cu.ft. is as follows:-

Erecting cost only

5 men for 2 days (16 Hrs.) at 2/6d. per hr. = £10 = 1.2d. per cu.ft.

5 " " 7 " (56 Hrs.) " " " " = £35 = 4.2d. " " "

(2) The Power Operated Winch

The ease of handling the lighter winch gave a big advantage over the first prototype. There have, however, been a number of mechanical defects on the engine. Premature bore wear was experienced and this suggests that in going to a 350 c.c. engine we have overdone the weight saving and a 500 c.c. engine would probably be more suitable in spite of the extra weight. This winch has, however, been given some particularly heavy work in connection with winching in loads of thinnings to the ropeway rack. There is some difference of opinion amongst users as to whether winching in is practicable in a close plantation and if the winch is not required to do this, then, the 350 c.c. engine is adequate.

Three cases of broken valves are almost certainly due to over-revving an ungoverned engine by an unskilled operator.

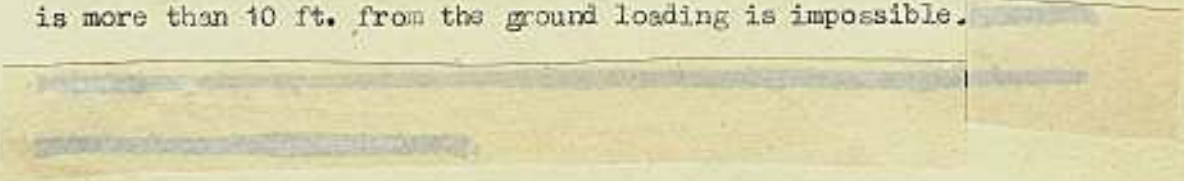
One gearbox failure occurred.

It has not been found possible to ensure correct winding of the cable on the winch drum. This is particularly noticeable when winching in the loads to the rack but for the ordinary operation of the ropeway there is less trouble in this respect.

The winch brake is not quite adequate for controlling long cable descents at high speed, a second brake would be an advantage.

(3) Operation

When properly erected there is no difficulty in the operation of the ropeway but the main weakness in the design is the time required for loading the carriage. Mechanical hoists with a lift of 10 ft. are provided but they are slow, more than half the operating time being absorbed in loading and unloading. At points where the carriage is more than 10 ft. from the ground loading is impossible.



(4) Anchors

The "Holdfast" Anchors have proved satisfactory on the whole but great care in their location and fixing is required. There is one recorded case of an anchor pulling out of the ground.

(5) Operating Costs

Operating costs up to date show a wide variation owing to differing conditions, the skill of the operating team and differences in the volume to be extracted from any particular site. At Appendix C, however, is given a set of figures based on a fair average from recorded results.

R. G. SHAW

Machinery Research Officer

Power Operated Ropeway (Second Prototype) - Specification600 yds. ropeway

<u>No. off.</u>	<u>Item</u>	<u>Supplier</u>
1	Portable winch with 600 yds. $\frac{1}{4}$ " diam. cable.	Automower Engineering Co.
1	Waterproof cover for winch	" "
1	Main cable drum with wheeled carrier and ratchet	" "
4	Adjustable chain sling 12 ft. long with quick release	" "
2	Carriages	" "
6	Hangers	" "
2	Snatchblocks (automatic release)	" "
1	600 yds. 15 MM diam. cable flattened strand 6 x 7 V. Langs Lay. Special Improved Rust Resisting Plough Steel	British Ropes Ltd.
6	15 ft. lengths $\frac{3}{8}$ " diam. cable Best Plough. Blue Strand. Preformed with thimble one end and ferrule (or bound with wire) at the other.	" "
12	Double throat clamps for $\frac{3}{8}$ " diam. cable	" "
1	Trewhella Winch and handle	Trewhella Bros.
1	Drum Rope 50 ft. length	" "
1	Grab or Rope Shortener for 15 MM cable	" "
12	Eight spike anchor units	" "
2	Westons Differential Chain Blocks with guides to give 10 ft. lift.	Willets.
3	Telephones - Battery less-Portable List No. L.51	Telephone Manufacturing Co.
1	Telephone cable 1200 yds. 3/.036	G.P.O. Stores
1	Roll Balloon cable (for guy ropes)	F.C. Stores.

APPENDIX C.

Power Operated Ropeway (second prototype) - Estimated Operating Costs

Calculations based on a 600 yd. ropeway being fed from 75 yds.
on each side therefore serving 18 acres yielding 200 cu.ft. per acre.

Output per site therefore = 3,600 cu.ft.

Cableway Capacity = 60 cu.ft. per hour.

Erecting Cost - 5 men 4 days = £20 = 1.3d. per cu.ft.

Depreciation - £200 per year of
500 running hours
= 8/- per hour

(60 cu.ft.) = 1.6d. " " "

Operating Costs

Maintenance at 1/- per hour

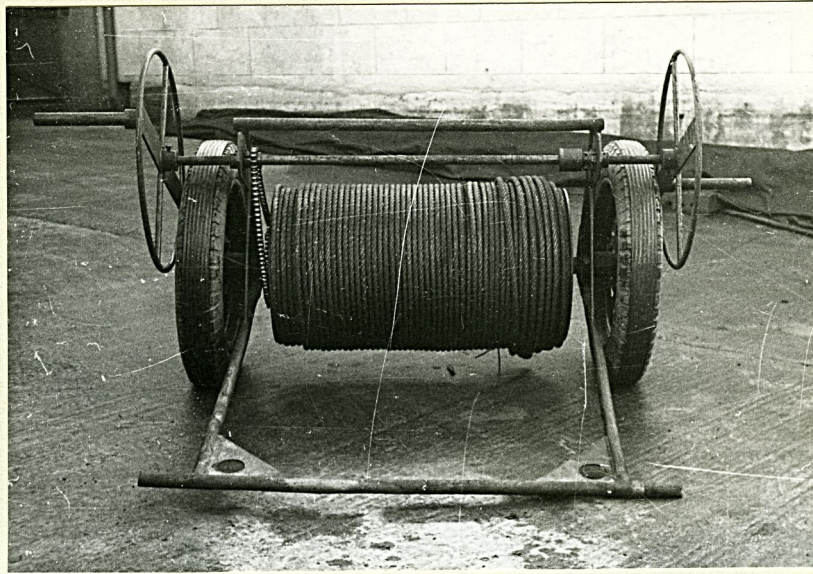
Fuel at 2/- " "

5 men at 12/6 " "

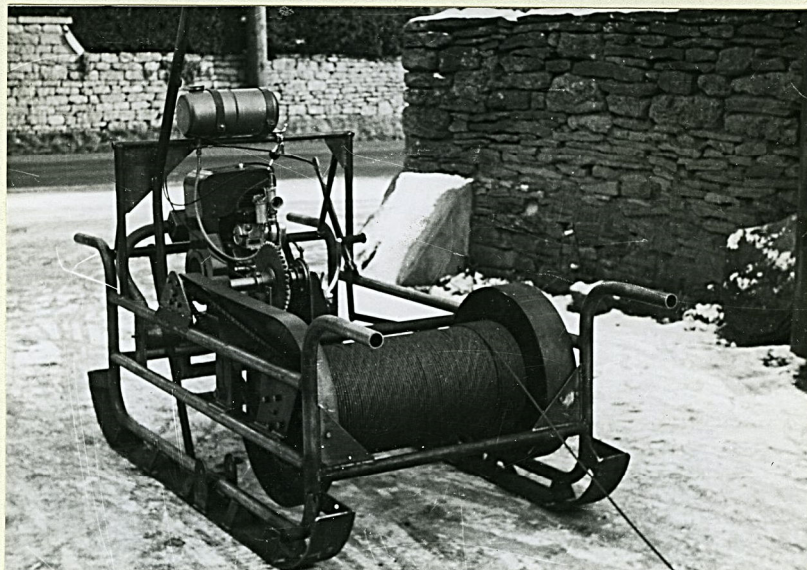
Total operating cost = 15/6 per hour (60 cu.ft.) = 3.1d. per cu.ft.

Total cost = 6d. " " "

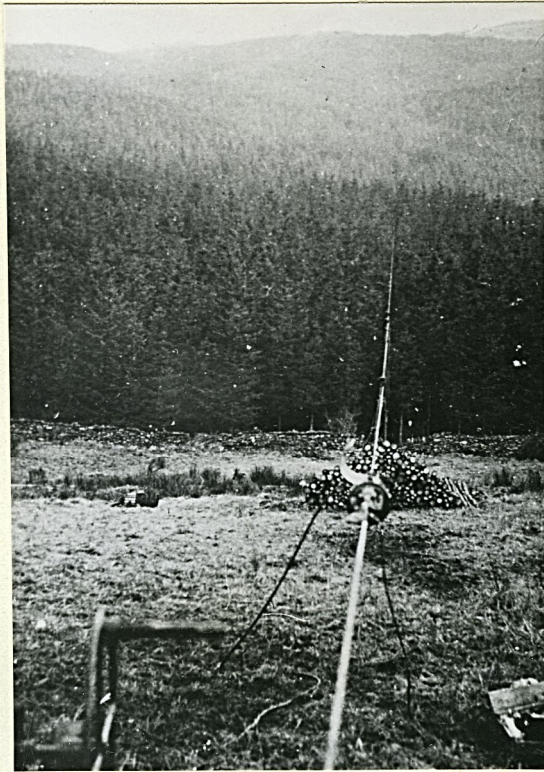
This figure of 6d. per cu.ft. covers only the cost of the ropeway extraction and a further charge of about 3d. per cu.ft. must be added to cover hauling from stump to ropeway giving a total stump to roadside figure of 9d. per cu.ft.



Main Cable Drum



Power Operated Winch



General View from the bottom anchor (Intermediate supports are not visible)



A load arriving at the unloading point