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New South Wales Government Tramways.

K 31979

Engineer for Tramways Office,

Phillip House,

109-119 Phillip Street,

IN YOUR REPLY, PLEASE QUOTE

R.S.
Your 38/3/4

Sydney, 16th July, 1929.

T.P.Strickland Esq.
Chief Engineer,
Melbourne & Metropolitan
Tramway Board.
673 Bourke Street,
MELBOURNE.

Dear Mr.Strickland,

Your letter of the 4th instant and specifications reached me safely, for which please accept my sincere thanks. We are now hard at work in preparing our specification for calling tenders in Australia.

With kind regards,

Yours faithfully,

RECEIVED
18 JUL 1929

A.F. Wray
per J.F.

File No E/38/3/4

July 4th 1929.

A. G. Wray Esq.,
Engineer for Tramways,
N.S.W. Govt. Railways & Tramways,
Phillip Street,
SYDNEY, N.S.W.

Dear Mr. Wray,

AUSTRAL OTIS RAIL GRINDING MACHINE.

I enclose copy of report prepared by my Officers concerning the Austral Otis Rail Grinding Machine. I trust that this includes the information that you require, but if there is anything further that we can supply I shall be glad if you will let me know.

With regard to grinding costs, these have varied from 2.6d. to 3.3d. per foot of rail, depending on the depth of corrugation treated. These figures include labour, materials used, such as grinding wheels, lubricants, etc., power (calculated at the rate of 1d. per unit) and 59% overhead on labour.

With kind regards,

Yours faithfully,

T. P. Strickland

5-7-29.

ENC.

ATO'M/MIC

SEP. COV. 4/7/29 Specifications (2).

July 4th 1929.

AUSTRAL OTIS RAIL GRINDERS.

1. General Design.

The general design of the Austral Otis machine embodies the use of one motor having a belt drive to a main countershaft. When travelling fast this countershaft drives the axle of the power truck through a lay shaft by means of two large chains. When travelling slowly during grinding operations the countershaft drives through a friction pulley and worm gearing onto another system of chains which again drive the axle. The countershaft is also used to transmit power by means of ropes to the grinding trucks. This drive is in two stages, the first being rope and the second chain, the chains being enclosed in rocker arms and running in an oil bath. The drive for the grinding wheel on one side is quite separate from the other, so that the wheels on one side can be run without the other, if necessary, and this involves having the grinding truck in two sections each having its own drawbar so that the rope can be kept tight on each side.

This design involves the use of a large amount of power transmission machinery which could be avoided if the grinding truck were supplied with its own motor, operating through a short belt drive with jockey pulley onto the grinding wheel spindle. Such a grinding truck could be hauled about and traversed slowly during grinding operations by using an old tram car suitably converted and so fitted with electrical controls that the slow motion could be governed from the grinding truck.

If I were going in for a number of additional grinding machines I would seriously consider designing such an outfit, as it would eliminate most of the troubles which we have had with the Austral Otis Grinder, namely, troubles due to chain and rope drive.

Another advantage of the machine which I have outlined above would be that the grinding truck could be made in one solid unit and the grinding spindles or shafts could be made the full width of the truck, thereby throwing much less weight on the bearings. We have found that roller bearings cut out in about 6 months and probably if the shafts were the full width of the truck this period would be exceeded considerably.

2. Number of Grinding Wheels.

With regard to the use of four grinding wheels simultaneously, we find that one man cannot properly look after two wheels at once, and the advantages of having four wheels are therefore only as follows:-

(a) When one of the wheels goes out of action due to the breaking of a chain or other fault, the operator on that side can carry on for the remainder of the shift with the other wheel.

(b) On curves and other places where the corrugation is more severe on one rail than on the other, the man in charge can assist the wheelman on the heavy side by using the other wheel and thereby getting over the work faster.

It is the opinion of my Officers that the extra cost of the additional wheel and the cost of maintaining the gear are not justified by the advantages referred to above.

3. With regard to the specification I am forwarding herewith, if the same type of machine were to be ordered I would have the following alterations made:-

Page 2, 2nd par. The speed 15 m.p.h. should be reduced to about 12.5 m.p.h., as this enables the machine to climb most of the hills in high gear.

Page 2, 4th par. I think it would be advisable to specify that the brakes should be such as to bring the machine to a stop on level track from full speed within a certain distance. The track brakes supplied as emergency brakes on the Austral Otis machine are practically useless, as it takes about 100 feet to stop the outfit on level track, from a speed of 13 m.p.h.

Page 3, 1st par. The cabin should contain a cupboard for accommodating tools and spare parts.

Page 3, par. 4. The speeds of the grinding wheels should be checked before the machine is accepted, as we found in the case of No. 1 machine that the speed was too high. The motor speed regulation is so small that it can be practically neglected. Our specification provided for wheel diameter of not less than 18".or more than 24", but if more machines were purchased the diameter would be fixed at 24", as 18" wheels are not nearly as economical to use.

Page 3, par. 5. The tank should be large enough to hold a full night's supply of water. Our present machine running with four grinding wheels uses about 300 gallons per night and the tank holds only about 150 gallons, hence about 10 minutes are lost in each shift while the tank is being filled.

Page 3, par. 6. If chain drive is offered either on the axles or on the grinding spindles I think it is essential that some provision should be made, either by means of eccentric bushing or jockey pulleys so that slackness in the chains can be taken up from time to time. In practice it is found that the chains become too loose for proper operation before a link can be taken out. A gear drive onto the axles would be very much preferred to a chain drive as the former would ensure a uniform traversing motion while grinding. While speaking of chain drives, our first machine was fitted with Westinghouse Morse silent chains and these were rather too small for the job and have given a good deal of trouble. If the chains had been designed larger, that is, with greater factor of safety, they would probably have operated satisfactorily. On the second machine the Company fitted roller chains of the Coventry or Reynolds type and although the machine has only been in operation for about two weeks these chains have been quite satisfactory up to the present.

Page 3, last par. The wheel dressers on the Austral Otis machine are not satisfactory. It is very difficult to dress the wheels to a concave surface. The second last sentence in this paragraph should read "approved mechanisms should be fitted for lateral adjustments of grinding wheels".

Page 4. 4th par. The first sentence in the paragraph might be omitted. It is impossible to operate the feed of the grinding wheel from the other side of the truck, and in any case the feed should not be locked under any circumstances, as breaking of wheels would result

Page 4. 6th par. Sand boxes. The valves at the end of the sand pipe on the Otis machine are not of the right type, as pieces of sand get caught in the flap door and enable the rest of the sand to run out. We are now designing the valve with sliding gates to take the place of these.

Page 4. 8th par. The lubrication on the Austral Otis machine is particularly good as there are over 100 alemite greasing points fitted. The grinding spindles run in ball bearings which are greased by alemite from the outside ends of the grinding shaft. With regard to the grinding spindle bearings, the number 1 machine was fitted with ball races fitting in phosphor bronze sleeves which in turn were fitted into a hollow steel sleeve. We found that the phosphor bronze bushes became slack after a couple of months running and had to be renewed. In the second machine the phosphor bronze was omitted and the S.K.F, ball bearings fitted directly to the steel sleeve. The machine has not been running sufficiently long to enable us to say whether this is any improvement or not. We estimate that the ball bearings at the outer end of the spindle, costing about £5 each, will last only about 6 months.

Page 4. last par. The motor has given us no trouble whatever. They are of B.T.H. manufacture and 75 H.P., and about 1000 r.p.m.

Page 5. 1st par. A controller supplied with the first machine was of the Crane type, not of tramway type, and had to be replaced. An ammeter should be supplied with the machine as the operators find it very useful when taking a heavy cut. We have fitted one to each of our machines at the rear where it can be easily seen by the wheelmen.

Page 5. 4th par. Lighting. This is in two circuits, each consisting of 6 lamps in series. The lamps have been specially shrouded so that when the outfit is travelling at high speed the driver is

not dazzled by the lights. The headlights are not fitted on the fascia board as specified, but are fitted about 3 feet from the ground in the front of the cabin panelling, as in an ordinary tramcar. At the grinding end, however, there is a light fitted to the fascia board throwing down onto the track.

Page 5, 6th par. Grinding capacity. The capacity of the Austral Otis machine is very much in excess of the figure specified by us, even with only two wheels in operation. The capacity could be stated as from 300 ft. of single track to 700 ft. of single track, depending on the depth of corrugation treated, per shift of 5 hours effective working time.

Page 7, 2nd par. Maintenance. We specified 3 months maintenance, but this period should increased to 6 months at least. I might say that the Austral Otis Company has given very good maintenance service, but I cannout say what sort of service they would supply in another State.

Rope Drive Our machines are fitted with rope drive from the counter shaft to the grinding truck. The ropes originally supplied were of cotton, and we have recently tried Manilla ropes on the second machine but they have been a total failure. Cotton ropes should be insisted on. These ropes stretch a great deal and the outfit should be supplied with a spare pair of drawbars of extra length so that they can be inserted after the ropes have stretched about a foot. In addition we are now fitting to No. 1 machine a roller to keep the ropes from coming in contract with the main casting of the grinding truck. They had a tendency to do this when the ropes were rather slack.

Accessibility of chain to grinding spindles. The machines as supplied to us were not provided with removable covers on the rocker arms, and we are now providing these so that the chains can be inspected, orremoved if necessary, without dismantling the whole rocker arm. This, in my opinion, should be insisted on, as the cost of taking down a rocker arm and removing a chain and replacing it would be about £5.0.0

General. You might gather from the above notes that the machines have not been very satisfactory, but this is not the case. Upto the present we have not lost a single shift due to defects in the machine. In 9 months' actual operation we have, with one machine, ground 15½ miles of single track, all of which was heavily corrugated.