

STEAM LOCOMOTIVE DEVELOPMENT IN ARGENTINA—ITS CONTRIBUTION TO THE FUTURE OF RAILWAY TECHNOLOGY IN THE UNDER-DEVELOPED COUNTRIES

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1. INTRODUCTION

The purpose of this Paper is to suggest that in under-developed countries of the 'Third World', which lack finance for heavy capital investment but have adequate supplies of indigenous fuel such as coal or wood, there is scope for the continued development of steam traction. Substantial improvements in performance, efficiency and availability can be achieved with steam traction by application of modern techniques⁽¹⁾.

The Author supports this premise by giving details of improvements to various types of existing locomotives in Argentina, where capital available for railway development has been severely restricted, of a prototype 4-8-0 locomotive which developed probably the highest power output in relation to weight of any metre-gauge steam locomotive and of the 2-10-2 type locomotives of the Rio Turbio mineral railway in Patagonia. The last mentioned machines, incorporating gas-producer firebox and other features designed by the Author, regularly haul 1,700-ton mineral trains over this 2 ft. 5½ in. gauge line, 160 miles in length, despite an axle loading restricted to 7½ tons, and on test have hauled a train 3,100 tons (127 vehicles) on level track sustaining 1,200 drawbar h.p.

From experience gained with the Rio Turbio 2-10-2 type locomotives the Author has prepared designs for a 2-8-0 type general purpose locomotive, adaptable to track gauges from 3 ft. 0 in. to 5 ft. 6 in.; combining high performance capacity with an axle loading of 13 tons. He has also prepared designs for a high-powered 2-10-0 and for a Mallet type locomotive of adequate power to haul 10,000-ton trains.

The writer would stress that his Paper is directed to the traction requirements of under-developed countries, where the application of a new steam technology in conjunction with the use of local fuels, often of poor quality, could be highly relevant. Furthermore, in the Author's view, the possibility of global scarcity of petroleum products, making desirable the use of alternative fuels where practicable, provides additional justification for this Paper.

The writer gladly acknowledges that the inspiration and starting point for his work was an exhaustive study of the work of M. Andre Chapelon in France. The application of M. Chapelon's researches into improved exhaust systems and flow through the steam circuit resulted in the rebuilding, from 1929 onwards, of the compound

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Pacific-type locomotives of the Paris-Orleans Railway, with an increase of maximum power from 2,200 to 3,700 i.h.p.; and gave a new life to the steam locomotive^(2,3).

2. IMPROVEMENTS TO EXISTING LOCOMOTIVES

2.1. Metre-Gauge 4-8-0 Four-Cylinder Compound Locomotive

The rebuilding by the Author, of an existing 4-6-2 type locomotive as a 4-8-0 followed closely the principles applied by M. Chapelon to the rebuilt 4-8-0 locomotives of the P.O. Railway, where maximum power output was raised from 2,200 to 4,000 i.h.p.; with adhesive weight increased by 33%, compared with the Pacific type locomotives from which they were rebuilt⁽⁴⁾.

The rebuilt locomotive has a working pressure of 285 p.s.i. and a total engine weight of 68 tons in working order, of which 54 tons are adhesive. To ensure maximum freedom of steam flow and to reduce pressure drops to a minimum the cross section of steam ports was increased to 25% of the piston area. The boiler was fully welded except for the main barrel seam and built entirely by hand without flanging.

It may be mentioned that practically the whole of the new components in the rebuilt engine were of welded mild steel plate construction; pistons, cylinders, streamlined casing, tender tank extension, axleboxes, etc., being built by this means.

Other features of the locomotive were a supplementary superheater between H.P. exhaust and L.P. admission, as used on M. Chapelon's rebuilt 2-12-0 of the SNCF, and a fully balanced built-up crank axle with 135° crank setting.

Despite numerous initial teething troubles, until steam leakage problems had been overcome, this locomotive has given extremely good results and the maximum power output attained, 2,120 db. h.p.; was almost exactly in proportion of locomotive weights (68:108) to that of the P.O. Railway 4-8-0 rebuilds.

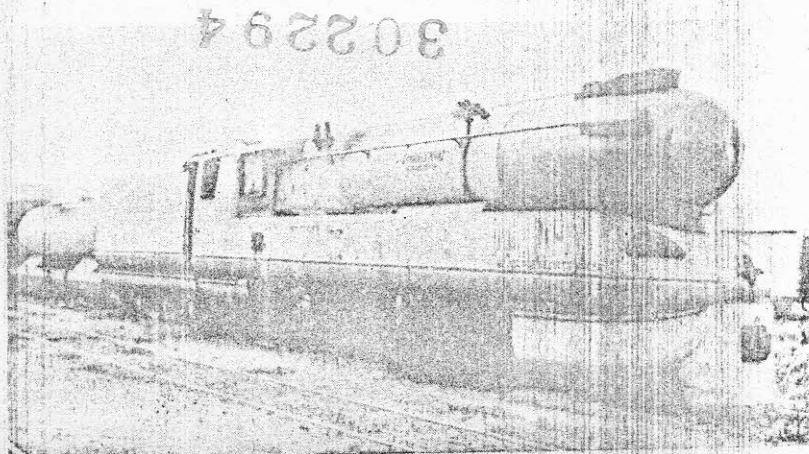


Fig. 1.—Prototype metre-gauge 4-cylinder compound 4-8-0 locomotive.

