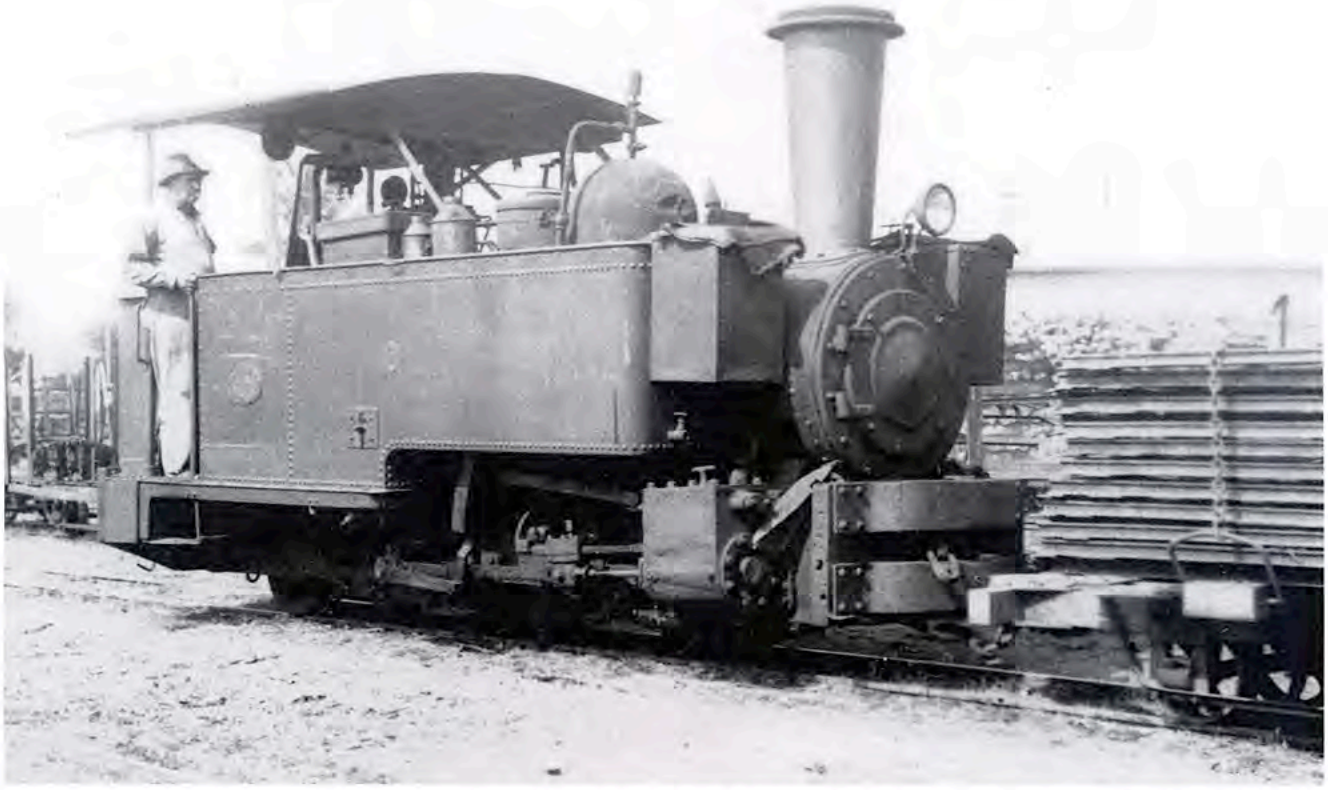


In November 1946, Mourilyan sugar mill 0-4-2T number 3 (John Fowler 12967 of 1911) is about to leave the mill yard, heading for the fields with a load of portable track. *Photo: Ken Rogers, from George Bond Collection*

Portable railway track for light railways

by Lynn Zelmer

Scope of portable track applications

Agricultural and industrial enterprises the world over installed similar systems of light railway to carry their goods to mill or port or market. While established enterprises eventually developed a substantial fixed rail infrastructure, new enterprises and in-field operations often used less permanent, portable transport systems. These portable railways had rails and sleepers fitted together into lightweight track panels that could be quickly laid down and taken up again without skilled labour.

Manufacturers in Europe, the United Kingdom and the United States supplied track and other components for portable rail systems to industries, mines, farms and colonial plantations in the late nineteenth and early- to mid-twentieth centuries. A Welsh quarry, a timber contractor or a colonial sugar plantation could telegraph an order for a complete portable tramway system using the manufacturer's catalogue and product codes. Orenstein & Koppel's circa 1900 catalogue, found in Queensland's Mount Morgan Mine archives and still seemingly used in the 1950s, explains the advantages of a portable railway.

*A **workman** conveys by means of a wheel-barrow on pretty level ground about 180 lbs., while on rails, well laid down, and by means of suitable vehicles, he can convey about 2000 lbs., or 13 times as much in the same time.*

*A **horse** draws at the average-rate on a level field-way about 1800 lbs, on a level road about 2½ tons.*

On rails the horse will draw under the same conditions, and with less exertion, about 10 tons, and in one third of the time.

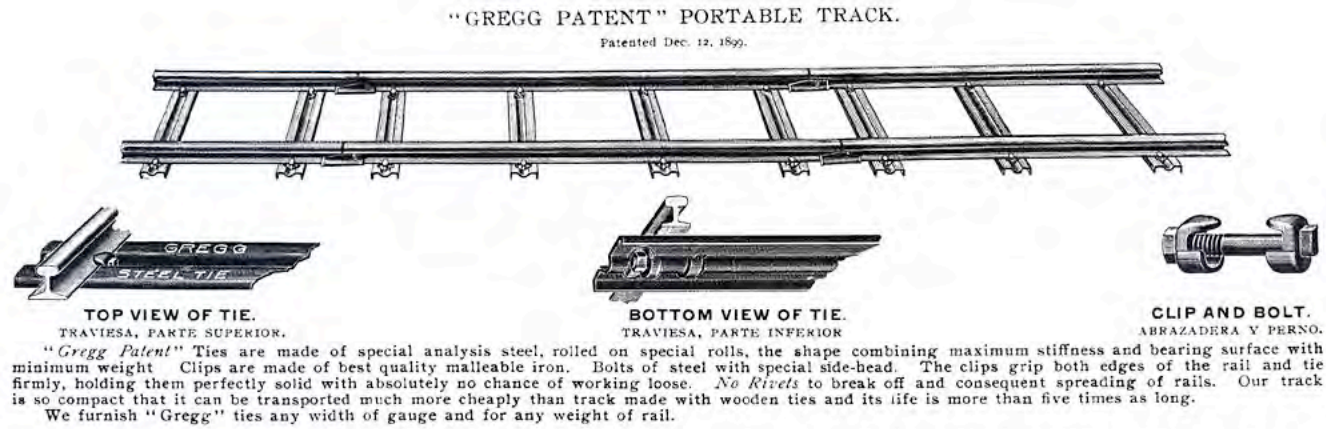
*According to circumstances, the working by **locomotives** offers considerable advantages and savings compared with that by animals. As regards the capacity of the narrow-gauge locomotives, they will convey, according to their size, 50 tons to 150 tons, at a speed of 8 to 15 miles per hour.*[1]

Manufacturing capability at the destination was often minimal for a new enterprise but the prefabricated systems were simple enough that they could be assembled by unskilled workers. If the destination had riveting or other mechanical skills, significant savings in shipping costs (paying by weight not measure) could be made by on-site assembly. Some manufacturers established local or regional works, but distances and the time required for shipping often led to the local manufacture of subsequent requirements, especially when there was a related need for increased engineering capability in the major enterprise.

Temporary portable track was commonly laid in Australian and overseas sugar cane fields to bring cane from the cutters to a nearby permanent way for transport back to the mill. Laid without ballast, and sometimes without the track panels even being bolted together, these lines moved from field to field as cutting progressed in order to minimise the distance cutters were required to carry bundles of cut cane.

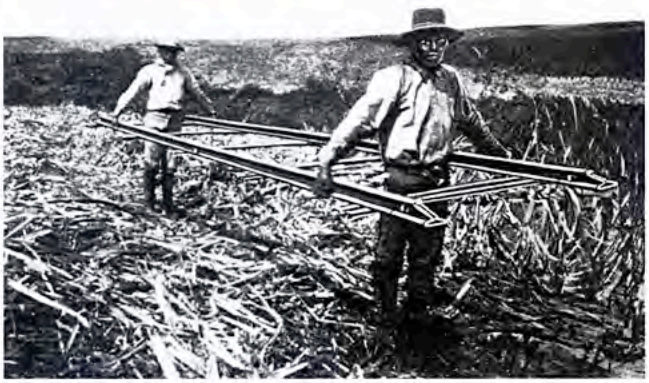
The Colonial Sugar Company mill at Homebush in north Queensland was possibly the first Australian plantation to adopt the Decauville system in its entirety, with Monsieur Paul Decauville himself overseeing the installation in 1883. According to a press report of the time, Homebush had 20 miles of the Decauville line, 500 cane trucks, horse drawn on the portable sections, and two locomotives operating on the permanent way.[2]

Other Decauville-supplied operations in Australia during the 1880s included Colonial Sugar Refining Company (CSR)



'Gregg Patent' Portable Track showing tie and clip design. *Drawing: Gregg Catalogue in Condé.*[13]

(53,000 yards, of which roughly a third was presumably for Homebush); Queensland Sugar Co for the Innishowen Mill, Innisfail (2500 yards); Swallow & Derham, Hambledon (7000 yards); Alstonville Sugar Co (3500 yards); Loridan for the Pyramid Mill, Gordonvale (2500 yards), Pyramid Sugar Co, Gordonvale (4000 yards) and Coueslant for Chateau Tahbilk Vineyard near Shepparton (100 yards).[3]



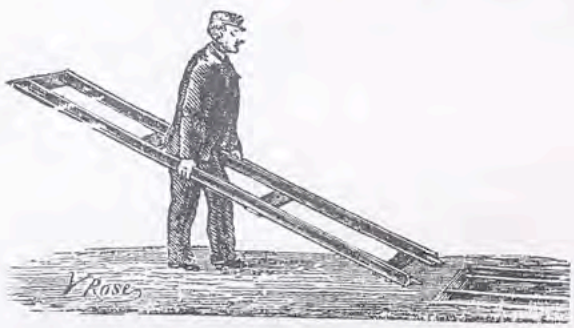
Carrying what appears to be a five metre long straight section of portable track fitted with splice shoes.
Drawing: Gregg Catalogue in Condé.[14]

The 1880s were the heydays of the supply of portable railway systems, complete in some cases with light steam locomotives. After it was realised that steam locomotives and true portable track did not mix very well, it continued to be used for non-locomotive worked lines in many industries, and the development of light internal-combustion locomotives during the first World War (WWI) increased their usefulness in extractive industries and construction.

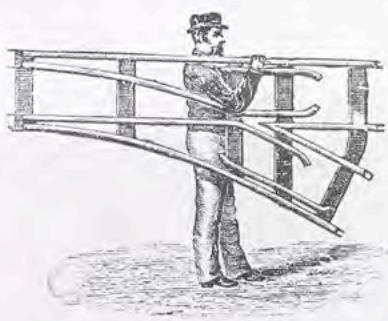
Countries with links to specific European countries, or to the United States, were likely initially supplied by manufacturers in those countries, and specific industries may have been dominated by a particular company. The Fijian sugar mills were largely developed by CSR so it is likely that the first portable railway systems there were also supplied by Decauville. Orenstein & Koppel was undoubtedly an early supplier of portable track to mills in Java, as was Decauville. However by the early 1900s most major European manufacturers appear to have been represented across much of Australasia and Southeast Asia while Gregg was a major supplier for Hawaii and parts of Central America.

Temporary railway systems made a significant contribution to WWI military operations, with human and animal powered tramways as well as more permanent lines operated with steam and petrol powered locomotives. A popular video derived from historical footage shows soldiers loading ballast skips, for example, and pushing them to a loading stage during the construction of 600mm gauge lines in France.[4]

Some temporary lines became more permanent, albeit operated with horse power, and their legacy at Moreton Mill, for example, continued up to closure with at least one 'horse line' where bins were pushed in/out by tractor. In some cases portable track sections were simply bolted together and remained, often without ballast, from season to season, sometimes with some timber sleepers inserted. In other locations the portable track was replaced with more



The Track is in portable sections and can be quickly laid or relaid for immediate use.



The Crossings are riveted up in one piece ready for use.

These illustrations, taken from a 1905 advertisement for London agents Alexander Von Glehn & Co., show some of the advantages of the 'Decauville Portable Railway'.

LIGHT PATTERN SLEEPER for 10/20 lbs. rails
Code 36108

Assemblages de joints de rails pour voies transportables

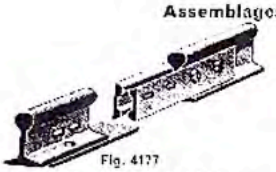


Fig. 4177
Eclisses normales à boulons en forme d'éclisses d'insertion avec plaque de joint.

Fig. 4179
Eclisses d'insertion rivées à bouts arrondis avec plaque de joint.

Fig. 4178
Patins de rail, simple assemblage sans boulons.

Top: *Hudson's lightweight sleeper design with standard Clip and Bolt pattern, "the cheapest and best to use for all ordinary work" with 10-20 lbs rail. Drawing: R Hudson Ltd.*[15]
Above: *Ferrostaal AG's three standard rail joiner (or fishplate) types for portable rail; each manufacturer had their own versions with slight variations. The cast version at right, similar to Gregg's patented 'splice shoe', was the most expensive but used only one bolt or rivet and, according to the manufacturers, offered a reliable and quick connect-disconnect. The other connectors are a variety of fishplate. Drawing Ferrostaal.*[17]
Above right: *Orenstein & Koppel system (two screwbolts with nuts and clips for each end of the sleeper) for fastening rail to corrugated steel sleepers. Drawing: Orenstein & Koppel.*[16]
Right: *This standard left hand switch appears to be a 5 metre length, the same as a standard straight section. Drawing: Orenstein & Koppel.*[18]
Below: *Gregg's one piece portable switch, right hand, shown with a throw bar and connected to straight sections on all three ends. Drawing: Gregg Catalogue in Condé.*[19]
Bottom: *This Hudson catalogue diagram was provided to "help clients unfamiliar with the nomenclature of the different types" and for planning an order. The passing loop consists of a pair of turnouts and two sections of curved track, the length of the curved sections being determined by the radius of the curve (both of the curved section and the turnout itself) and the track centres required. The use of standard straight sections allows the loop to be extended as long as required. Drawing: R Hudson Ltd.*[20]

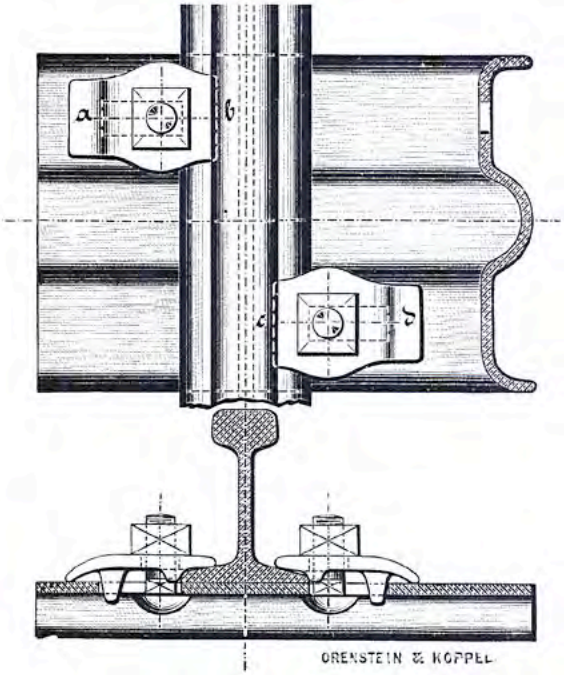


Fig. 3018.

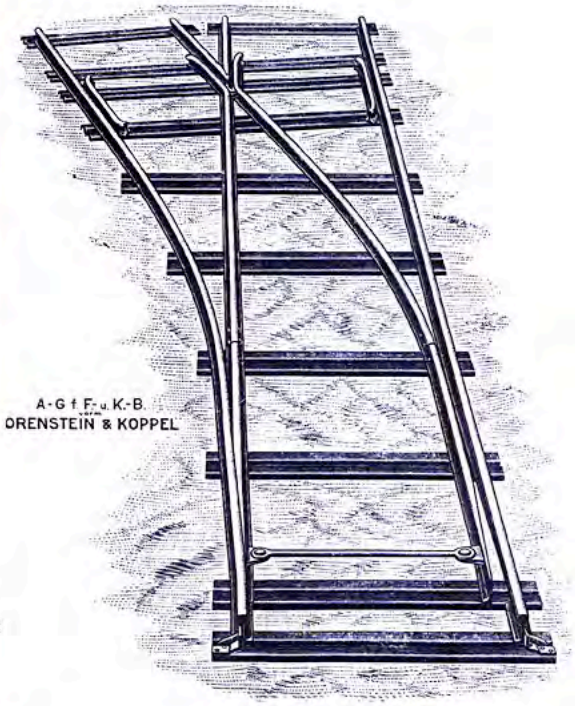
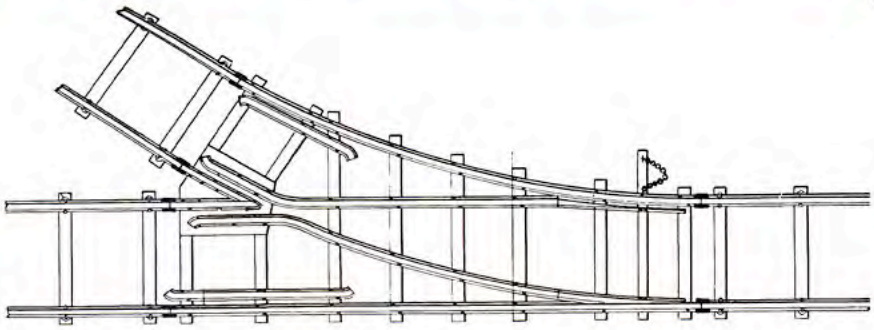
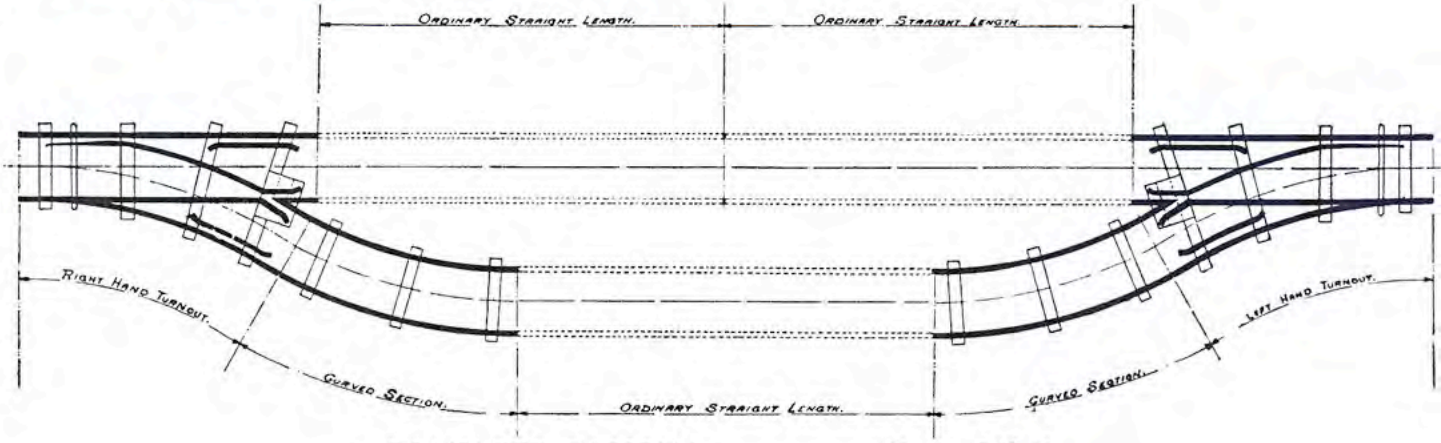


Fig. 3058.





COMPLETE PASSBYE Code 36241

Size	Description	Suitability and Maximum Load
1	10lbs rail, 7lbs 33-inch long standard clipbolt sleepers spaced 1610 per mile (1000 per kilometre), 24-inch gauge	Suitable for carrying light agricultural produce: maximum 36 cwt (4032 lbs) on four wheels, traction by hand at very slow speeds
2	12lbs rail, otherwise as per No 1 size	Max 48 cwt (5376 lbs) on four wheels
3 *Standard Size*	14lbs rail, otherwise as per No 1 size	Standard for light traffic with animal traction or small tractors at slow speeds (4mph), maximum three tons (6720 lbs) on four wheels
4	16lbs rail, otherwise as per No 3 size	Maximum three tons 8 cwt (7616 lbs) on 4 wheels
5	18lbs rail, 11lbs 33-inch long standard clipbolt sleepers spaced as per No 1	Traction by light locomotives at slow speeds (7mph), max four tons (8960 lbs) on four wheels
6 *Standard Size*	20lbs rail, otherwise as per No 5 size, fairly hard work with heavy traffic requires more sleepers (1760 per mile)	Standard for mining, contractors and estate work, traction by light locomotives at 8mph, max four tons 12cwt (10,304 lbs) on four wheels

Table 1: Hudson Portable Railways: sizes three and six were most common when the catalogue was published circa 1930.[7]

conventional but lightweight track and timber sleepers, probably using rail salvaged from an upgrade elsewhere. In any case the track might or might not have ever been ballasted with anything more than dirt. Even with some ballast the more permanent lines tended to sink into the ground and to disappear under weeds or grass.

Portable track systems, both for temporary in-field use and as the basis for more permanent lines between the cane fields and the permanent way, are still used in the cane fields of Fiji, Java and elsewhere, but it is unlikely that temporary track using portable rail sections would meet health and safety requirements in countries such as Australia, even for short term construction projects.

Portable track components

Manufacturers provided engineering and practical advice as well as the infrastructure components. A Hudson catalogue, for example, explained the economics of rail size.

For long railways it is cheaper to use a light rail with locomotives having three axles, thus keeping a light axle load. For very short railways it is often cheaper to use a locomotive with two axles, and heavier rails. On estate work it is general to use a permanent line with heavy rails for the main haulage and light temporary lines in the cutting fields as feeder tracks. The latter are moved forward as cutting proceeds and are simply laid on the ground without ballasting. The wagons are loaded on these temporary lines and afterwards transferred to the main line.[5]

Hudson was responsible for developing the specifications for British Standard portable railways in the twentieth century. The table above describes the six sizes for their portable railway systems and the limitations for each. At the time the Hudson catalogue was published the demand for sizes 1, 2, 4 and 5 had diminished to the extent that they were assumed to soon be obsolete.[6] Hudson also supplied similar rail systems with heavier components but these were considered to be for permanent way.

Manufacturers supplied all or part of the components required for a railway, temporary or permanent. As noted above, some cost savings were possible by importing components for local assembly. At the very least, unassembled components made for more compact loads for shipping purposes. It was possible to use timber sleepers, rather than steel or iron sleepers, but that was likely confined to more permanent systems as portable track sections using timber sleepers would be much more difficult to handle without mechanical loading equipment.

A variety of sleeper designs were available, with the simplest being a formed steel plate with open ends as can be seen on the Gregg Patent and Hudson track sections. Soft ground, heavier rail and traffic all required a more substantial sleeper—perhaps with closed ends, longer, heavier or of an improved design. The 33-inch long sleeper, spaced 1610 per mile (one metre apart), for two foot gauge track, as described by Hudson, seems to be fairly common with manufacturers.[8] Manufactured steel sleepers had pre-drilled holes to ensure correct gauge when assembled with that manufacturer's fastening system.

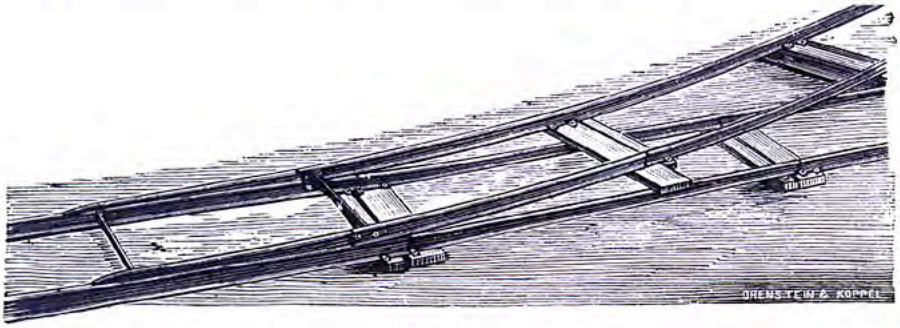


Fig. 3065.

Left above: *Single inclined plane, used for temporarily transferring wagon on and off the permanent way. It consists of a single 5 metre section of 10 metre curved track and a 1.5 metre tongue section held together with tie rods. Other, more permanent options included an incline with a rotating section which could be turned to clear the main track. Drawing: Orenstein & Koppel.*[21]

Left below: *Hudson's portable type turntable with inclined mounts (inclined planes) placed on ordinary portable track, Drawing: R Hudson Ltd.*[22]

Use of the "Decauville" Off-railer.

The Off-railer is composed of two pieces of forged iron, about 4 ft. long, and the same height as the "Decauville" Rail, but tapering down at one end. It is riveted up in one piece with sleepers and fish plates. When it is placed upon a line it allows the Wagons to run easily from the original track on to the new one, the direction of the Track can therefore be quickly and temporarily altered (to left or right) at any point. Branches can be made in any direction from the fixed Track without interrupting the traffic.

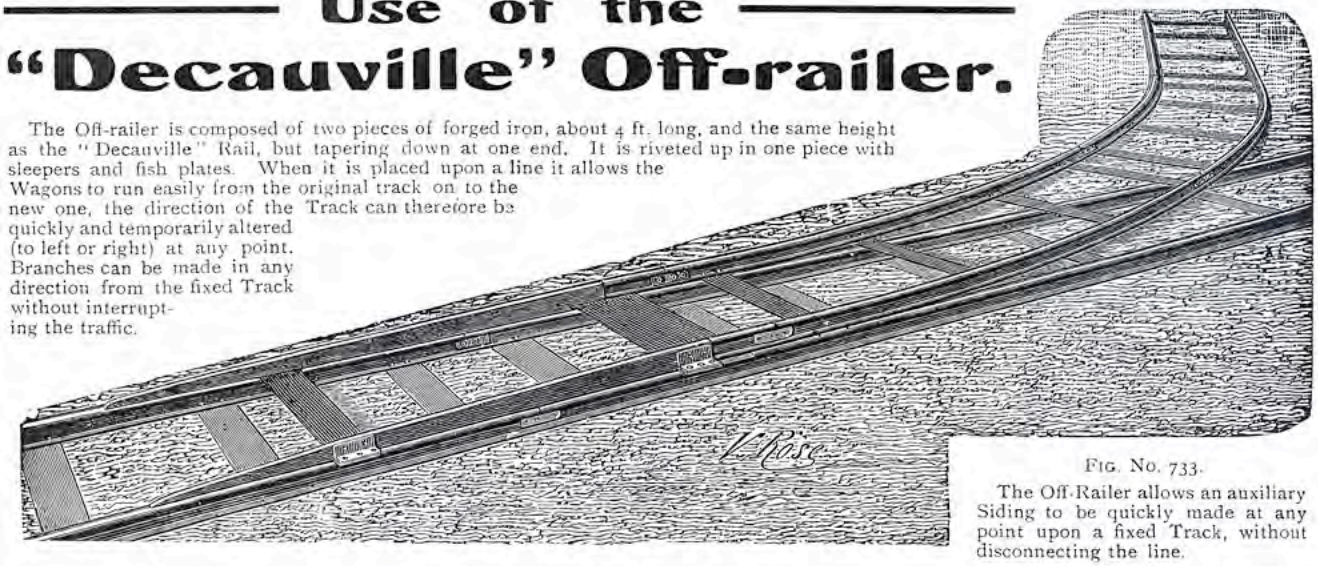


Fig. No. 733.

The Off-Railer allows an auxiliary Siding to be quickly made at any point upon a fixed Track, without disconnecting the line.

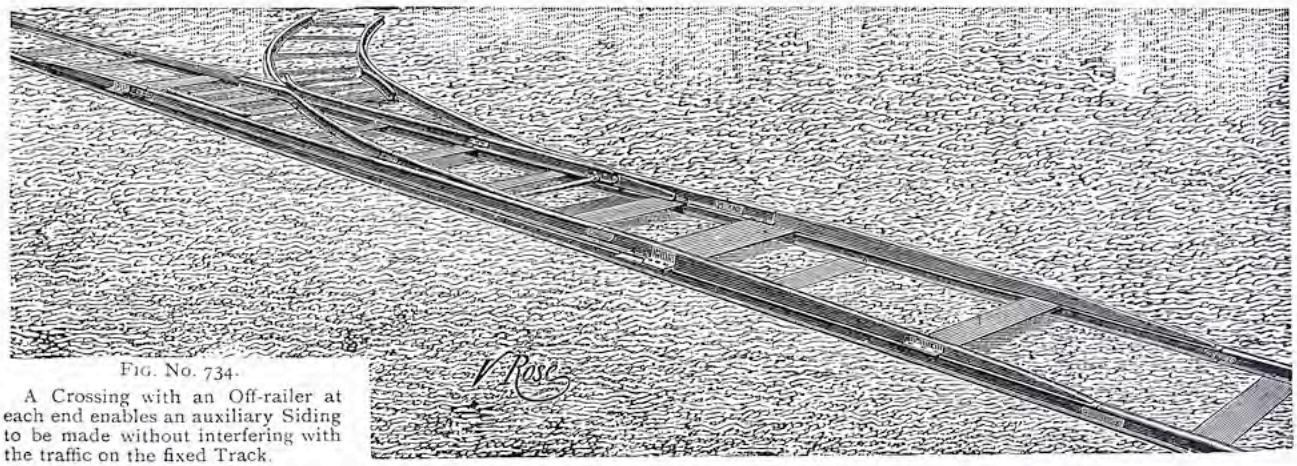


Fig. No. 734.

A Crossing with an Off-railer at each end enables an auxiliary Siding to be made without interfering with the traffic on the fixed Track.

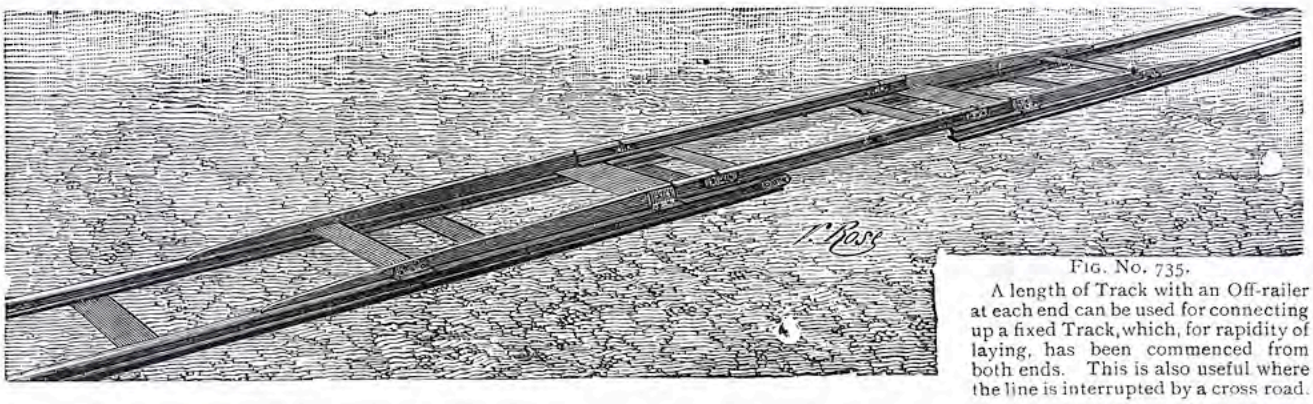


Fig. No. 735.

A length of Track with an Off-railer at each end can be used for connecting up a fixed Track, which, for rapidity of laying, has been commenced from both ends. This is also useful where the line is interrupted by a cross road.

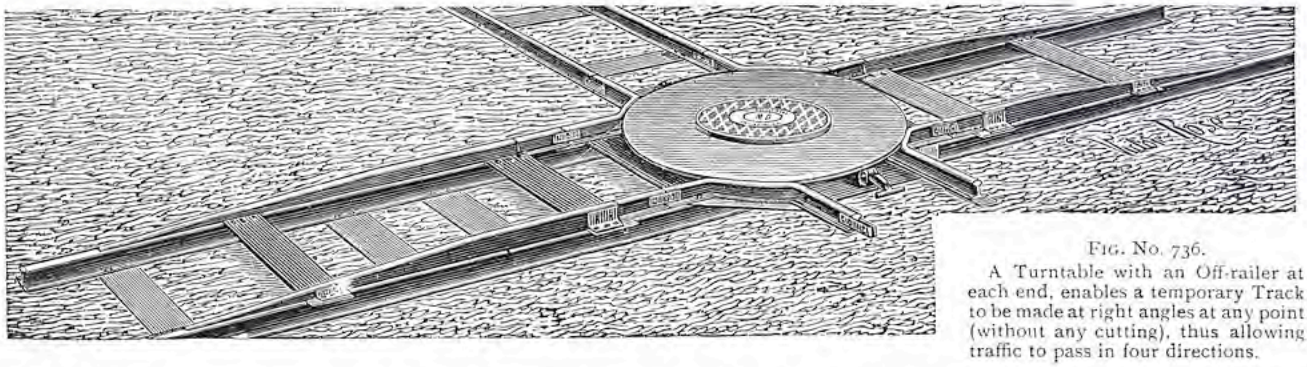


Fig. No. 736.

A Turntable with an Off-railer at each end, enables a temporary Track to be made at right angles at any point (without any cutting), thus allowing traffic to pass in four directions.

This page, from the "Decauville" Portable Railway Illustrated Catalogue No. 105, January, 1905, illustrates a number of useful applications for the "Decauville" Off-railer.

Portable track components at Tavua depot, Fiji, October 2009. Note that the track sections have a pair of fishplates at only one end of each rail. Photo: Ian Dunn

Hudson's clip and bolt system for attaching rails to the sleepers is very similar to other manufacturer's basic designs. Alternatives included riveted fasteners and even welding, although welding track components together may just have been an act of desperation from an owner whose workers had lost too many of the standard fittings.

Out depot south of Nadi, Fiji, looking back towards the chain tightening gang's shed, with portable track stacked to one side, May 2010. The straight sections appear to be 7 metres long, while the curved sections are closer to 3-4 metres. Photo: Wayne Harman

Similarly, manufacturers had fairly common systems for joining rail sections together. Ferrostaal AG's three standard rail joiner types were fairly typical, with an angle iron fitting being another possibility. The catalogues argued for the more expensive slip-on clips, with two on one end, but the author has only seen bolted on clips (fishplates) in Australian or Fijian use. In these two countries it appears usual to have one pair of fishplates on each end of the track panels, with the fishplates on opposite rails to allow them to be joined without turning them end for end. While the manufacturers were promoting their slip-on clips in the early 1900s, failing to bolt the sections together would certainly invite derailments and hinder productivity as loading increased.

Portable track sections normally came in fairly common lengths, regardless of gauge or manufacturer. Orenstein & Koppel, for example, state that: "*Our standard lengths of railway sections are 5 and 2½ metres upon 5 and 3 sleepers respectively. Curved sections of 5 metres lengths are fitted on 6 sleepers to meet the heavier strain on them*".[9] Their standard curves had a radius for the outer rail of 10 or 25 metres.[10]

The catalogues also included a wide selection of other railway appliances, including inclined planes (to temporarily diverge from or cross the permanent way without a set of points or a crossing), portable level crossings (for tractors, wagons, etc., to cross the temporary line without damaging the track), portable turntables, and a variety of switches (points) and crossings.

Depending upon the length of the switch (turnout) set (2.5, 5 or 7-metres), it might come as a single unit or as two pieces for easier transport. The longer the set, the broader the radius of the curve and thus the longer the wheelbase of the wagon that could traverse it.

Today portable track generally only exists in museums in Australia. However sugar cane growers still require transport for their cut cane from the field, and in at least several countries this still means temporarily laid portable railway track with wagons moved by hand, animal power or tractor.

Acknowledgments

A sincere thank you to John Browning for suggesting this article, and providing both editorial assistance and research materials.

My personal interests are in modelling the sugar cane railways, thus the emphasis on that industry in this article. Portable railways were also very common in a number of other industries, including quarries, mines, sewage works, construction sites and other forms of agriculture. Roy C Link's handbook[11] provides an excellent introduction to these applications from a UK (Robert Hudson Ltd) perspective and is particularly useful for modellers. Additional easily accessible information on the history of portable railways can be found on the web site of the Ripon & District Light Railway.[12]

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21. Orenstein & Koppel, op cit, page 25.
22. R Hudson Ltd, op cit, Code 36361, page 38.

PG Sumberharjo, Java: portable track on cane truck. This mill loads its wholestalk cane longitudinally; unloading is done by sling, rather than tipping the truck. Sumberharjo still had seven steam locomotives in use in 2010 and is one of the few mills left in Indonesia to operate field lines.
Photo: John Browning

Olean Mill, Java: water buffalo pulling a single load of wholestick cane along a line constructed from portable track sections. Although the line looks to be quite well established, the ratoon cane springing up between the rails shows that the canefield was only harvested recently and the track will be moved elsewhere once harvesting moves to another area. *Photo: John Browning*

Assembagus Mill, Java: a short inclined plane, followed by a section of tight radius curved track leading into a field from the permanent way. In Queensland, these were known as 'riding points'. It's impossible to tell from the photo, but the permanent way probably incorporates some timber sleepers and is ballasted with dirt claimed from the area beside the track. *Photo: John Browning*