

8th June, 1916.

**BRENNAN THIRD RAIL DEVICE FOR UNIFYING
THE RAILWAY GAUGES OF THE COMMON-
WEALTH OF AUSTRALIA.**

Lecture by CHARLES WILKIN, M.I.M.E.

(Illustrated by the Kinematograph at West's Olympia
Theatre, Darlinghurst, 8/6/'16, at 4 p.m.)

MR. BRAGG (President of the Association) introduced
the lecturer and welcomed the visitors.

MR. WILKIN: Mr. President and gentlemen. The uni-
fication of the Australian railway gauges is a matter
that has occupied the thought and attention of the engi-
neers and politicians of the Commonwealth, as well as,
to a large extent, the mercantile community, for many
years. We need not, at this stage, go into the question
of the origin of the different gauges, because that is a
matter of history. It is no use worrying ourselves now
with the causes of the break of gauge; we must set
about trying to solve the difficulty.

This matter has been under consideration for a num-
ber of years. Some 12 or 13 years ago I had the oppor-
tunity of seeing the models of Mr. Brennan's third rail
switch invention, and from that date to the present mo-
ment I have taken a very keen interest in it, because I
profess to be a third-rail engineer. Thirty-four years
ago I laid down the first mixed gauge in Australia, which
is working to-day as satisfactorily as it did on the first
day I laid it, to the entire satisfaction of the Railway
Commissioners and everyone who has used it. After
some considerable time I was successful in getting the
Railway Commissioners of the day to consent to a model
being made at Mr. Brennan's expense. This was made

in the interlocking workshops in Sydney—the model you have seen outside. That was the first step on the road of progress. Then it was taken up enthusiastically by the present Government of New South Wales, with the result that a practical test was given at Tocumwal, N.S.W.—kinematograph views of which will be shown to you presently—a test which proved, beyond all reasonable doubt or cavil, that the third-rail is undoubtedly the solution of the great break of gauge difficulty in Australia. Every reasonable, thinking man, now admits this.

I am not going to speak this afternoon of the military, mercantile, or any other phase this system will have on our national life—that will be apparent to everyone—I am simply here, as an Australian engineer, to show what has been done, and what can be done with it.

The Great Western Railway Co. of England was the first concern to adopt the third rail. They had a 7ft. gauge, while the other companies adopted a 4ft. 8½in. gauge. The Great Western people found that their difference in gauge gave them much difficulty, and lost them a considerable amount of freight—they were practically isolated from the other railway companies until they adopted the third rail. The engineers who carried out that system must have been very clever and far-seeing men, because the device they introduced served for over 27 years, the accomplishment of the end they desired. By the courtesy of Mr. Lucy, the Chief Mechanical Engineer of the N.S.W. Railways, I was permitted to see proof that the Great Western Co., 40 years ago, ran a train at over 78 miles an hour over a mixed gauge. Yet we are told it is not safe! You may ask, "Why this delay?" There have been certain factors against it all along, and even to-day we have objectors,

honest objectors who have never seen the third-rail, who will not listen to it simply because they do not and will not understand. They do not know how wonderfully effective it is, what it has accomplished, and how very simple it is. I am hopeful, however, that all objections will be removed—I feel sure they will be removed after the objectors have seen the apparatus proven beyond question. You have, no doubt, read in the newspapers that the recent Premiers' Conference decided to have a committee of gentlemen appointed to go thoroughly into the whole subject, and report as to the method and cost of carrying out the scheme.

After receiving my instructions from the Minister, I placed the matter in the hands of William Thornley and Sons, who laid out, first of all, a set of Brennan's switches, a model of which you have seen demonstrated outside. Mr. Thornley and I went into it very thoroughly, spending many hours and days to make it a perfectly sound, permanent way. (I should like to take the opportunity here of thanking him for his very great assistance.) It was decided to go still further. We built a cross-over road, also a change of common rail, a narrow gauge rail, a mixed gauge rail, and a broad gauge rail. All these were laid down in his yard and tested by bogies as far as we possibly could; but, owing to the cramped nature of the premises and the difficulty of getting a locomotive in, we were unable, at that stage, to test it with a locomotive. It was then decided to test it thoroughly at Tocumwal. I then called for the assistance of my learned colleague, Mr. Henry Dean, and we built a one-mile railway, with cross-over road, and narrow, broad, mixed gauge, and change of common rail. The result was, on the 12th November last, a test, in the presence of thousands of people, including State Governors, the then Prime Minister of Australia (Mr.

Andrew Fisher), all the leading engineers, politicians, business men, and others from all the States of the Commonwealth. Two trains, made up of two engines, about 90 tons each, of the N.S.W. "P." type, and the Victorian "D.D." type, with carriages—over 200 tons—ran over the rails at a speed of 45 to 50 miles an hour. Before this test was made, I was told by railway experts here that it was an utter impossibility to make a mixed gauge cross-over. "How are you going to manage about a turn-table?" we were asked. "You cannot put three rails across a turn-table." The absolute success of the trial showed how far the critics were out. The turn-table has been working since last November, and the engines of Victoria and New South Wales are turning on it four or five times a day. We took the engines through the cross-over road at speeds of 25 and 30 miles an hour, and, speaking from long experience as a practical switch and crossing man, the switches and crossings we have in the third-rail system are at least 25 per cent. stronger than any other switches or crossings in use on the Victorian or New South Wales Railways to-day.

In the views that will presently be screened you will see the experiments that were conducted in Thornley's yards and at Tocumwal. Everything is absolutely to standard, the inter-locking, the switches, the cross-overs, rails and gauges. The third rail is working very satisfactorily in other parts of the world: the Germans are using it extensively in Poland, and it is being used in Mexico. They are not thinking about it, or talking about it, as we are—they are using it.

Brennan's switches consist of five sets. Where you have rails so closely together as $6\frac{1}{2}$ in. (the difference between 5ft. 3in. and 4ft. $8\frac{1}{2}$ in.), a difficulty presents itself, and this is got over by the adoption of

movable frogs or switches. Although this idea of the third rail has been in the minds of engineers for years past, nobody would accept it officially from the third-rail standard. It has proved itself, however, to be absolutely safe, sound and practicable, and it can be worked and interlocked by standard arrangements; it is very simple and inexpensive. As against the estimate of £37,000,000 submitted by expert departmental engineers to make the railway gauges uniform, the third rail will only cost, from Brisbane to Port Augusta, about 2¼ millions. The scheme of the departmental engineers was to do it in sections, involving a multiplication of changing stations. With the third rail no changing stations are required at all; you can run from Rockhampton to Perth with passenger or goods trains.

The late lamented Lord Kitchener, who took a keen interest in the defence problems of Australia, said, when he was here:—

“Gentlemen, you must have a uniform gauge if you want to defend your country.”

These words of warning should burn into our ears when we remember that, under the existing system, it would take no less than 63 days to transport an army of 30,000 men from Melbourne to Brisbane, whereas, with a uniform gauge, they could be taken through, easily, in 15 days!

(At this stage the following kinematograph views were shown on the screen):—

1. Complete single line junction, constructed on Brennan's system, at Thornley's yards, completely signalled and interlocked with N.S.W. railways standard gear, and fittings showing the simplicity of connection, and its easy adaptability to ordinary methods provided for safe working.
2. Complete mixed gauge cross-over third-rail principle, built on Brennan's system. This device comprises 10 separate switches, all working synchronously, and ac-

tuated by an ordinary single spring catch lever of N.S.W. railways standard type.

(N.B. In America. twelve switches are frequently operated by one lever.)

3. Examples of broad gauge (5ft. 3in) and narrow gauge (4ft. 8½ in.) turnouts from mixed gauge main line.
(The lecturer explained that this arrangement is the only safe method, for the reason that if two ordinary switches were used, and became misplaced, a train of one gauge could be turned on to the track of a different width and would be derailed.)
4. Change of common rail device. This is for the purpose of always bringing carriages or wagons to the same distance from the edge of the platforms; also, for engine turntables, and many other conditions in station yard construction.
5. Example of a Victorian or South Australian 5ft. 3in. track, crossing a mixed gauge railway, showing design of crossings.
6. Test of the third rail at Tocumwal, showing the thorough testing of the various devices with engines and trains of both gauges, demonstrating the practical suitability of the third-rail method as the solution of the break of gauge problem.

Discussion.

MR. HOYLE, Minister for Railways, in a brief speech, outlined the reasons that prompted the installation of the experimental track, and said that the success that had attended this venture augured well for the scheme if it were carried still further.

THE PRESIDENT (Mr. Bragg): It is my very pleasant duty to propose a vote of thanks to Mr. Wilkin this afternoon. Personally, I have found his lecture very interesting. I was at the exhibition at the Tocumwal yards on the 12th November, last year, and I think, if anything the kinematograph views give one a very much better idea of the scheme than the actual scenes at the place itself. It is a sort of subversion of the old say-