THE . BRENNAN . MONORAIL

Something About the Wonderful Invention That May Revolutionize Railway Travel. . . . .

(Chamber's Journal.)

It was November 10, 1909—a day that shall surely have its place in history beside that other day, eighty-five years ago, when George Stephenson drove the first railway locomotive between Stockton and Darlington. In the great square of the Brennan torpedo factory at Gillingham, in Kent, where the figuring tops of battleships in the adjacent dockyard poise above the stone coping of the wall, there was a line of railway laid down in a circle of a quarter of a mile. Switches linked it up with other lengths of line, a straight stretch down to a muddy cape of the Medway estuary and a string of curves and loops coiling among the stone and iron factory sheds. What was strange about it was that it was single—just one line of rails on sleepers tamped into the unstable "made" ground of the place. And there was Louise Brennan, his face red with the chill wind sweeping in from the Nore, his voice plaintive and Irish, discoursing at slow length of revolutions per minute, of "precession," and the like. The journalists from London who had come down at his invitation fidgeted and shivered in the bitter morning air; the affair did not look in the least like an epoch in the history of transportation and civilization, till—

"Now, gentlemen," said Brennan, and led the way across the circle of tracks.

And then, from its home behind the low, powder magazine-like sheds, there rode forth a strange car the like of which was never seen before. It was painted the business-like slaty blue gray of the war office; it was merely a flat platform, ten feet wide by thirty feet long, a steel cab mounted on its forward end, through the windows of which one could see a young engineer in tweed standing against the blur of moving machine parts. It ran on the single rail; its four wheels revolved in a line, one behind another, and it traveled with level, flexible equilibrium of a ship moving across a dock. It swung over the sharp curves without faltering, crossed the switch and floated, floated is the only word for the serene and equable quality of its movement—round and round the quarter mile circle. A workman boarded it as it passed him and sat on the edge with his legs swinging and its level was unaltered. It was wonderful beyond words to see; it seemed to abolish the very principle of gravitation; it contradicted calmly one's most familiar instincts. Every one knows the sense one gains at times while watching an ingenious machine at its work—a sense of being in the presence of a living and conscious thing, with more than the industry, the pertinacity, the dexterity, of a man. There was a moment, while watching Brennan's car, when one had to summon an effort of reason to do away with this sense of life; it answered each movement of the men on board and each inequality of the makeshift track with an adjustment of balance irresistibly suggestive of consciousness. It was an illustration of that troublesome theorem which advances that consciousness is no more than the correlation of the parts of the brain, and that a machine adapted to its work is as conscious in its own sphere as a mind is in its sphere.

The car backed round the track, crossed to the straight line and halted to take us aboard. There were not less than forty of us and it took up our inequably distributed weight without disturbance. The young engineer threw his lever over and we ran down the line. The movement was as "sweet" and smooth as the movement of a powerful motor car running slowly on a smooth road; there was an utter absence of those jars and small later shocks which are inseparable from a car running on a double line of rails. We passed beyond the sheds and slid along a narrow split of land thrusting out into the mud-flanked estuary; men on lighters and a working party of blue-jackets turned to stare at the incredible machine with its load. Then back again, three times round the circle, and in and out among the curves, always with that unchanging stateliness of gait. As we spun round the circle she leaned inward like a cyclist against the centrifugal pull; she needs no banking of the track to keep her on the rail. A line of rails to travel on, and ground that will carry her weight—she asks no more. With these and a clear road ahead she is to abolish distance and revise the world's schedules of time.

"A hundred and twenty miles an hour," I hear Brennan saying in that sad voice of his, "or maybe 200. That's a detail."

In the back of the cab were broad, unglazed windows, through which one could watch the tangle of machinery. Dynamos are bolted to the floor, purring under their shields like comfortable cats; abaft of them a twenty-horse-power Wolseley petrol engine supplies motive power for everything. And above the dynamos, cased in studded leather, swinging a little in their ordered precession, are the two gyroscopes, the soul of the machine. To them she owes her equilibrium. Of all machines in the world the gyroscope is the simplest, for in its essential form it is no more than a wheel revolving. But a wheel revolving is the vehicle of many physical principles, and the sum of them is that which is known as gyroscopic action. It is seen in the ordinary spinning top, that stands erect in its capacity of a gyroscope revolving horizontally; the appartus which holds Brennan's car upright and promises to revolutionize transportation is a top adapted to a new purpose. It is a gyroscope revolving in a perpendicular plane, a steel wheel weighing 1,500 pounds and spinning at the rate of 3,000 revolutions to the minute. Now, the effect of gyroscopic action is to resist any impulse which tends to move the revolving wheel out of the plane in which it revolves. This resistance can be felt in a top; it can be felt much more strongly in the beautiful little gyroscopes of brass and steel which are sold for the scientific demonstration of the laws governing revolving bodies. Such a one, only a few inches in size, will develop a remarkable resistance. This resistance increases with the weight of the wheel and the speed at which it moves, till with Brennan's gyroscopes of 1,500 pounds each, whirling in a vacuum at 3,000 revolutions per minute, it would need a weight which would crush the car into the ground to throw them from their upright plane.

The working of Brennan's gyroscope was described at length in the press on the occasion of the exhibition of his model monorail car before the Royal society and in the grounds of his residence at Gillingham; for a clear understanding of the first full-sized car it will be well to recapitulate a few of the characteristics of the gyroscope. When Brennan made his early models he found that while the little cars would remain upright and run along a straight rail, they left the track at the first curve. The gyroscope governed their direction as well as their equilibrium. It was the first check in the evolution of the perfect machine; it lasted over ten years before he found the answer to the problem, ten years of making experimental machines and scrapping them, of filing useless patents, of doubt and persistence. But the answer was found—in the spinning top. A top set spinning and put down so that it stands at an angle to the floor will right itself; it will rise till it stands upright on the point of equal friction. Brennan's resource, therefore, was to treat his gyroscope as a top. He inclosed it in a case, through which its axles projected, and at each side of the car he built stout brackets reaching forth a few inches below each end of the axle. The result is not difficult to deduce. When the car came to a curve the centrifugal action tended to throw it outward; the side of the car that was on the inside of the curve swung up and the bracket touched the axle of the gyroscope. Forthwith, in the manner of its father, the top, the gyroscope tried to stand upright on the bracket; all the weight of it and all its wonderful force was pressed on that side of the car, holding it down against the tendency to rise and capsize. The thing was done; the spinning top had come to the rescue of its posterity. It only remained to fit a double gyroscope with the wheels revolving in opposite directions and save for engineering details, the monorail car was evolved.

Through the window in the back of the cab I was able to watch them at their work. Not the actual gyroscope but their cases, quivering with the unimaginable velocity of the great wheels within, turning and tilting accurately to each shifting weight as the men on board moved here and there. Over them were the glass oil cups with the opal green engine oil flushing through them to feed the bearings. The lubrication is a vital part of the machine; let that fail, and the axles, grinding and red hot, would eat through the white metal of the bearing as a knife goes through butter. It is a thing that has been foreseen by the inventor; to the lubricating apparatus is affixed a danger signal that would instantly warn the engineer.

"But," says Brennan, "if one broke down the other gyroscope would hold her up—till you could run her to a siding, anyway."

"But supposing the electric apparatus failed?" suggests a reporter, with visions of headlines perhaps. "Supposing the motor driving the gyroscopes broke down; what then?"

"They'd run for a couple of days with the momentum they've got," answers the inventor. "And for two or three hours that 'ud keep her upright by itself."

On the short track at Gillingham there are no gradients to show what the car can do in the way of climbing, but here again the inventor is positive. She will run up a slope as steep as one in six, he says. There is no reason to doubt him; the five-foot model which he used to exhibit could climb much steeper inclines, run along a rope stretched six feet above the ground, or remain at rest upon it while the rope was swinging to and fro. It would do all these things while carrying a man, and, for my part, I am willing to take Brennan's word.

He, Louise Brennan, was by no means the least interesting feature of the demonstration. He has none of the look of a visionary, this man who has gone to war with time and space; neither had George Stephenson. He is short and thick set with a full face and a heavy mustache hiding his mouth and heavy eyebrows. He is troubled a little with asthma, which makes him somewhat staccato and breathless in speech and perhaps also accentuates the peculiar plaintive quality of his Irish voice. There is nothing in his appearance to indicate whether he is 35 or 55. As a matter of fact, he is two years over the latter age, but a man ripe in life, with that persistence and belief in his work which is to engineers what passion is to the poet. The technicalities of steel and iron come easily off his tongue; they are in native speech, in which he expresses himself most intimately: All his life he has been concerned with machines. He is the inventor of the Brennan steerable torpedo, whose adoption by the admiralty made him rich and rendered possible the long years of study and experiment which went to the making of the monorail car. He has a touch of the rich man's complacency; it does not go ill with his kindly good humor and his single-hearted pride in his life work.

It is characteristic, I think, of his honesty of purpose and of his genius which is his driving force that hitherto he has concerned himself with scientific invention somewhat to the exclusion of the commercial aspect of his contrivance. Railroad men from all over the world have seen his model; but he has not been ardent in the hunt for customers. Perhaps that will not be necessary; the monorail should be its own salesman; but in the meantime it is not amiss that a great inventor should stand aloof from commerce.

There are times when he talks of the future as he hopes it will be, as he means it to be, when "transportation is civilization." Men are to travel then on a single rail on great cars like public halls, 200 feet long, 30 to 40 feet wide, whirling across continents at 200 miles an hour, from New York to San Francisco between dawn and dawn. They will not jolt over points and the cars will not strain to mount the tracks at curves; in each one the weariless gyroscope will govern an unchanging equilibrium. Tramway lines will no longer be a perplexity to paving authorities and anathema to other traffic; a single rail will be flush with the ground, out of the way of hoofs and tires. Motor cars will run on two wheels like a bicycle; it is to be a monorail world, soothed and assured by the drone of gyroscopes. It is a dream based on good solid reasoning, backed by a great inventor's careful calculation. H. G. Wells has given a picture of it in the last of his stories of the future.

Practical railroad men have given the monorail car a sufficiently warm welcome. They have been impressed chiefly by its suitablity to the conditions of transportation in the great new countries, as, for instance, on that line of railway which is creeping north from the Zambesi to open up the copper deposits of northwestern Rhodesia, and on through central Africa to the terminus at Cairo. Just such

(Continued on Page 8.)