The Brennan Mono-Rail Car.

By PERCEVAL GIBBON.

NOTE.—The South Australian Commissioner of Railways has given orders for the construction of a truck to be run on one rail, to experiment with the mono-railway. The experiment is to be made with a view to solving the problem of how to get produce to stations in the Pinnaroo district. The commissioner explained that there were four courses open—construction of a broad gauge, narrow gauge feeder lines, the laying down of a mono rail, or the making of roads—and this truck would indicate the value of the mono-rail system. If the experiment was successful the Government intended to build a number of the trucks, and hoped thus to convey produce over the sand hills cheaply.

IT was November 10, 1909—a day that will 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, where the fighting-tops of battleships in the adjacent dockyard poise above the stone coping of the wall, there was a track laid down in a circle of a quarter of a mile. Switches linked it up with other lengths of track, 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. The strange thing about it was that it was single—just one line of rail on sleepers tamped into the unstable "made" ground of the place.

And there was 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 track.

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 businesslike shatyblue-gray of the War Department. It was merely a flat platform, ten feet wide by forty long, with a steel cab mounted on its forward end, through the windows of which one could see a young engineer in tweeds standing against a blur of moving machine-parts.

It ran on the single rail; its four wheels revolved in a line, one behind another; and it travelled with the 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.

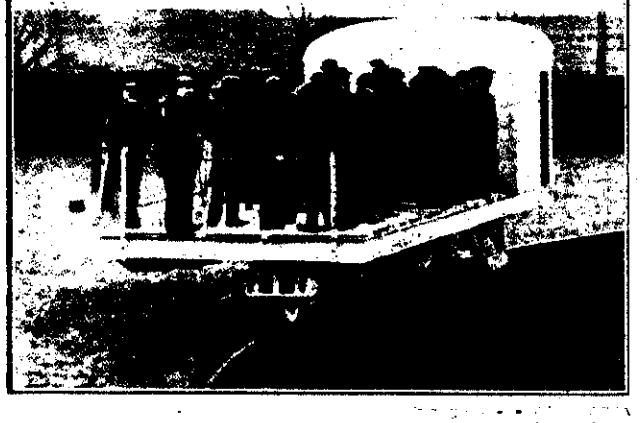
Every one knows the sense one gains at times while watching an ingenious machine at its work—a sense of being in the presence of a living and conscious thing, with more than the industry, the pertinacity, the dexterity, of a man. There was a moment, while watching Brennan's car, when one had to summon an effort of reason to do away with this sense of life; it answered each movement of the men on board and each inequality in the makeshift track with an adjustment of balance irresistibly suggestive of consciousness. It was an illustration of that troublous theorem which advances that consciousness is no more than the co-relation 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 about forty of us, yet it took up our unequally distributed weight without disturbance. The young engineer threw over his lever, and we ran down the line. The movement was as "sweet" and equable as the movement of a powerful automobile running slowly on a smooth road; there was an utter absence of those jars and small lateral shocks that are inseparable from a car running on a double track. We passed beyond the sheds and slid along a narrow spit of land thrusting out into the mud-flanked estuary. Men on lighters and a working-party of bluejackets 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 two hundred. 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 every thing. 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, which stands erect in its capacity of a gyroscope revolving horizontally.



THE FIRST MONO-RAIL CAR ON ITS TRIAL TRIP.

Showing the car taking a curve while unevenly loaded with passengers. The equilibrium was perfectly maintained by means of two Gyroscopes weighing three fourths of a ton each, and making three thousand revolutions a minute.

RAILROAD CROSSING OVER NEW YORK—THE "BOSTON-WASHINGTON LIMITED"

The apparatus that 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 three quarters of a ton and spinning at the rate of three thousand revolutions to the minute.

Now, the effect of gyroscope action is to resist any impulse that 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 that are sold for the scientific demonstration of the laws governing revolving bodies. Such a one, only a few inches in size, will develop a surprising resistance. This resistance increases with the weight of the wheel and the speed at which it moves, till, with Brennan's gyroscopes of three-quarters of a ton each whirling in a vacuum at three thousand revolutions per minute, it would need a weight that would crush the car into the ground to throw them from their upright plane.

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 was 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 spinning top set 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 enclosed it in a case, through which its axles projected, and at each side of the car he built steel 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 were 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 mono-rail car was evolved.

Through the window in the back of the cab I was able to watch them at their work—not the actual gyroscopes, 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. Above them were the glass oil-cups, with the opal-green engine-oil flushing through them to feed the bearings. 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 bearings 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