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A NEW DEPARTURE IN LOCOMOTIVE CONSTRUCTION.

By DR. ALFRED GRADENWITZ.

WHILE long-distance transportation has made enormous strides since the construction of the first steam railway, industrial transport over short distances is still at a relatively primitive stage. It is true that the introduction of industrial motor cars has done much toward improving this state of affairs, but they have their limitations, and fail to solve the problem.

It would obviously be a decided mistake to design a transportation service of this kind exactly on the model of a long-distance railway; and while coal locomotives still are the very soul of long-distance conveyance, they are generally quite unsuitable for

THE OIL LOCOMOTIVE OF A BELGIAN MINE.

the purposes of industrial railways. Even if the amount of raw material worked each day be considerable, it is of advantage to convey it in small individual trains.

A novel type of steam locomotive for drawing such trains has been recently constructed by Arthur Koppel. Liquid fuel is used, but in contrast with gasoline or alcohol locomotives, it is readily reversed without the use of any intermediary gearing, and both the power and speed are controlled by altering the steam charge in the cylinders, without resorting to the expedient of different ratios of transmission. The power and speed are thus readily adapted to the gradient to be negotiated and the load to be conveyed.

While the "hydroleum" locomotive, as it is called,

HYDROLEUM LOCOMOTIVE WITH DRIVE GEAR DISENGAGED,

HYDROLEUM LOCOMOTIVE 23.62 INCHES GAGE, $5\frac{1}{2}$ TONS WORKING WEIGHT, 25-30 HORSE-POWER.

HYDROLEUM LOCOMOTIVE HAULING A LOADED TRAIN.

A NOVEL GERMAN OIL LOCOMOTIVE.

possesses all the advantages of steam engines, having a high starting power and overload capacity, it, on the other hand, does away with the disadvantages; as it utilizes more fully the heating value of the fuel, there being no ashes or slag. The absence of any smoke or smell is another valuable feature of this novel locomotive. There are no ashes and slag to deal with, and the locomotive throws no sparks. Whereas it takes one and one-half to two hours to raise the steam in an ordinary locomotive, the hydro-leum locomotive can be got into working order in about fifteen or twenty minutes.

These valuable properties are mainly due to the design of the boiler and the choice of the fuel, which is either crude oil or tar oil. The latter, as is well known, is a residue from the manufacture of gas and coke, and can be obtained at a very low price; while being as fluid as water, tar oil, as compared with lighter petroleum products, is neither explosive nor combustible, combustion being produced only after a proper mixture with air. The hydro-leum locomotive is provided with a water-tube boiler, and possesses a considerable heating surface and remarkable capacity with very low dimensions.

Two different types of engine are generally used; either a twin engine analogous to the ordinary engine of coal locomotives, or a four-cylinder steam engine. The drive gear of this four-cylinder engine, which is the one most commonly used, is entirely inclosed and runs permanently in oil. The use of four parallel cylinders with cranks set at convenient angles secures a satisfactory compensation of the oscillating masses. Whenever it is desired to prevent the escape of steam, e. g., in tunnels, a condenser intended for temporary use can be fitted into the water boxes.

RAILROADING IN ITS INFANCY.

STAGE DRIVERS MADE CONDUCTORS OF PASSENGER TRAINS.

BY GEORGE P. FLOYD.

WHEN we think of the conditions and methods of traveling in this country seventy-five years ago and compare them with those of the present date, no one, unless he has had actual experience and has personally witnessed the steady progress made during the past sixty-five years, can begin to realize the changes and improvements in the modes of travel during that space of time. Those old stage coaches that we used to ride in before the railroads came into play, hung on leather thorough-braces, were mighty easy riding.

The first notice of coaches being hung on straps is that in which Louis XIV made his public entrance into Paris about the middle of the seventeenth century. Coaches hung on straps seem to have been introduced into England by Fritz Allen, Earl of Arundel, in 1555. The first mail coach in the United States was set up at Bristol, New Jersey, by John Palmer in 1732. It ran between New York and Boston, but not regularly. In 1756 there was a coach running between New York and Philadelphia—ninety miles; the time required to cover the distance was three days. In 1765 another coach was put on the line and it ran three days in each week. In 1788 the line was increased to two coaches daily each way, leaving Philadelphia at 10 A. M. In 1811 there were four coaches daily, each way, leaving Philadelphia at 10 A. M., stopping at Brunswick, New Jersey, over night, and arriving in Jersey City the next day at 12 M. The fare was \$8. A mail coach of the Diligence Line left Philadelphia at 1 P. M. every day, traveled all night, coming into Jersey City at 6 A. M., and each passenger was allowed fourteen pounds of baggage.

FROM STAGE COACH DRIVER TO CONDUCTOR.

As the railroads were completed and put in operation in the New England States about sixty-five years ago, the old stage drivers were made conductors of passenger trains. A number of the passenger conductors on the Boston and Providence and the Old Colony were stage drivers before the roads were completed.

Until 1852 there was no railroad running west of Chicago, all traveling being done in coaches. At that time I was running a passenger train on the Michigan Central road from Chicago to Detroit. I have seen as many as thirty-five or forty twelve-passenger stage coaches in front of the stage office at Lake and State streets, all loading up with passengers and baggage for all parts of the West. It is a well-known fact that the first railroad in America was a tramway, built in 1826 from the Quincy, Mass., granite quarries to a wharf on the Neponset River. It was used to transport blocks of granite to build the Bunker Hill monument; the road was three miles in length. About one hundred feet of that road is still in existence, left as a relic. The rails used to construct the road were scantlings laid on granite ties, with strap iron nailed on top. The cars were hauled by oxen and horses.

On the morning of August 9th, 1831, at the head of Lydius Street, Albany, N. Y., there stood on a railroad track a queer looking engine; behind it was a little tender with two barrels of water and about a half cord of pitch-pine wood and two strange looking passenger cars, consisting of the bodies of two stage coaches fastened upon railroad trucks. The little locomotive was built at the West Point foundry, and was taken to Albany by river boats. It weighed but four tons. It, with the two cars, was about to make a trial trip from Albany to Schenectady. A great crowd had assembled, and it was nearly time to start the train. Accordingly, everybody was full of interest and curiosity. The locomotive was the first of that character ever built to run on a passenger train in this country. It was called the "De Witt Clinton." The road was called the Mohawk and Hudson. The engineer was E. Mathews; and the conductor, John T. Clark, the first conductor in the United States to run a passenger

train, was an old stage driver. He stepped from platform to platform outside the coaches to collect the tickets, previously sold at the hotels and other places in the city. Mounting a little buggy set on the front end of the first car he blew his tin horn as the signal for departure. The engine started with a great jerk, much puffing and wheezing, and loud shouts from the crowd. The train moved off amid the black smoke from the pitch-pine wood, and a shower of sparks as large as walnuts, and thundered along toward Schenectady. The trucks of the cars were coupled together with chains or chain links, leaving from two to three feet slack, and when the locomotive started it took up the slack by jerks with such force as to jerk the passengers and send them flying across the coaches from under their hats, and when the train slackened up the dose was repeated. The pitch-pine smoke and cinders came pouring back the whole length of the train. Each of the outside passengers who had an umbrella raised it as a protection against smoke and fire. They found it but a momentary protection, for in the first mile the last one went overboard, all having their covers burnt off from the frames. A general melee took place among the passengers, each whipping his neighbor to put out the fire that was burning the clothes from their backs. A successful experiment was made for the purpose of remedying the terrible bumps and jerks that were causing such a panic among the passengers. The train was stopped, the three links in each coupling having been stretched to their extreme tension, a rail from the fence was extended horizontally between each pair of cars and fastened to its place by means of the packing yarn used for packing the cylinders. It was a success.

Some of the incidents of the trip were striking. A general notice of the contemplated trip having been given, it excited not only the curiosity of those living along the line of the road, but of persons from a distance, causing a large collection of people at all the interceding roads along the route. Everybody, together with his wife and children, came in all kinds of conveyances, and being as ignorant of what was coming as were their horses, drove up to the railroad as near as they could get, only looking for the best position to secure a good view of the train as it passed. As it approached, the horses took fright and wheeled, upsetting buggies, carriages, carts and hay wagons, and leaving for parts unknown. The train arrived in Schenectady with the passengers in a dilapidated condition as to clothes and hats, half of them being burned from their backs. After partaking of refreshments the train party returned to Albany. Such was the first locomotive trip in New York.

It should be added that the Mohawk and Hudson Railroad now forms the eastern terminal portion of the New York Central road at Albany. Originally eleven different companies owned and operated the railroads now composing the line connecting Albany and Buffalo. In 1850 there were seven distinct companies between these cities. The following year they were united under one management.

The Erie Railroad joined New York and Dunkirk on Lake Erie in 1851. The Baltimore and Ohio road reached the Ohio River the same year. By 1854 it became possible to travel from the Atlantic seaboard to Chicago by rail. In 1855 the Chicago and Rock Island connected Chicago with the Mississippi River. In 1837 there were but twenty miles of railroad in this country, while in 1840 there were 2,818 miles in operation; in 1850, 19,021 miles; 1860, 30,914 miles; 1870, 52,914 miles; 1880, 93,296 miles; 1890, 163,797 miles; 1900, 195,346 miles. Until 1850 three-fourths of the mileage was in the New England States.

The people in the United States have built more miles of railroad than were built by the three leading countries of Europe.

The first passenger train in the State of Pennsylvania made its trial trip in March, 1832, from Philadelphia to Germantown, drawn by the locomotive "Ironsides," built by M. W. Baldwin, founder of the great locomotive works that now bears his name. The engine weighed seven tons. On the first trial of the "Ironsides" it was discovered that the drivers were too light to give adhesion to the rail. So the builder and two machinists pushed it ahead until speed enough had been obtained, when all jumped aboard the engine in order that their weight might keep the wheels down. Moreover, the boiler was too small for the engine and steam could not be generated fast enough to keep it in motion for any length of time, so that for a portion of the distance from Philadelphia to Germantown it was necessary alternately to push and ride in order to cover the distance.

One of the most curious of early cars was the "Victory," a model of which is preserved in the office of the Eastern Railroad Association in New York. It was the first Monitor, or raised roof car, and was run on the Philadelphia & Reading road in 1836. The seats were arranged like an omnibus around the sides—the car was entered from the sides. At each end was a room, one for use as a toilet closet, the other was used as a bar, for our ancestors, in those days of universal drinking, were unable to do without their potations even on a railroad trip.

All the first railroads made use of wooden rails, upon which strap iron was spiked. These strap rails had an unpleasant fashion of curling up from the weight of a car on the central part combined with the action of heat and frost; when the ends of the rail were struck by the car wheels they would often be forced up through the bottom of the car; the train would have to stop and the snakehead, as they were called, would have to be pounded down, while the train went over it. Passengers on the cars were often injured by the accidents.

The old-fashioned custom of booking passengers as they did in old stage coach times was transferred to the railroads; each passenger's name was taken and a slip given him with the number of his seat in the car. This custom continued for a number of years after the first roads were run. It was not until 1853 that coupon tickets were issued. A passenger from New York to Chicago was obliged to buy a ticket over each road; that is, from New York to Albany over the Hudson River road, from Albany to Buffalo over the New York Central, from Buffalo to Detroit over the Great Western Road of Canada, and from Detroit to Chicago over the Michigan Central road.

In 1854 the fare from New York to Chicago was \$26. The local tickets were pasteboard cards with no date and used over and over until they were worn out. We did not know what a ticket punch was until 1856. No check was used on the conductors in any way. The fare was the same if paid on the train as it was when a ticket was purchased. The main object of the passengers was to get a good seat on the train, ticket or no ticket. While I was running a passenger train on the Michigan Central road in 1854-55, my cash way bill was frequently \$1,500 and \$1,800 a trip, on the day run. No tickets were sold at any of the stations on the road after 12 o'clock at night, all fares being paid on the train after that time, yet the boys gave the road a square deal. Some of the boys made money selling eggs, butter, and huckleberries, and made enough on the same to buy a brown-stone front or a farm and retire from the road.

PERILOUS DAYS IN TEXAS.

In 1873 there was but one railroad completed and running in Texas, the Houston & Texas Central, running from Houston to Denison, though a number of other roads were being constructed. The travel in that State was mostly done in stage coaches. Ben