

## EARLY ENGLISH RAILWAYS.

Ever Grades and Light Curves of the First Important Road.

Heavy Cuts and Embankments. Two Tunnels. Massive Viaducts, and Sixty-three Bridges in Thirty-one Miles—Yet the Liverpool and Manchester Road Paid from the First.

The recent trip of the little "John Bull" engine and its primitive train to Chicago has given many young Americans an idea of what railroading was in this country in its early days. In England, in France, and in the United States the railway era began at practically the same time, this country being at the outset decidedly in the van of the procession with its great distances to be covered and the comparative scarcity of money. In all these countries the need of regular and rapid communication was felt, and the development of the locomotive engine made it possible in them all at substantially the same time.

The Manchester and Liverpool Railway was the first steam railroad in England really worthy of the name. It was opened in 1825, and, considering the experimental stage of the business at that time, it must be counted one of the railroad wonders of the world. There had long been various short tramways in England, principally in the coal regions, operated with horses or stationary engines, and at least two roads operated with locomotives were already in existence—the Stockton and Darlington, opened in 1825, and the Monklands, in Scotland, opened in 1826; but they were both on a small scale, both were experimental, and neither depended entirely upon locomotives for power. Indeed, when the Manchester and Liverpool road was begun it was intended that the cars should be drawn either by horses or with cables operated by stationary engines; the use of locomotives was an afterthought.

In 1822 a company was formed to provide the best possible communication between Liverpool and Manchester—one the great seaport of England, the other the great manufacturing town. Although the population of Liverpool was then only about 125,000 the port was receiving every year nearly 500,000 bags of American cotton all of which had to be hauled or floated to the Manchester mills for manufacture. The freight traffic between the two cities was about 1,000 tons daily, and communication was so slow that the mills were often delayed, to the great loss of both proprietors and operatives. There was no doubt from the beginning that a railroad between the two points would be profitable, and the company had no difficulty in selling its shares. The distance was only thirty-one miles, and the company began with a capital of \$2,000,000, in shares of \$50 each.

But with what was thought abundant capital, there were still many difficulties to be encountered. The landed proprietors objected to having this newfangled iron road run over their estates, and they made such a strong fight in Parliament that the charter was not granted until 1826. In June of that year work was begun under the direction of George Stephenson. Stephenson was perfecting his locomotive engines, and he gave the idea of a real steam railway between the two cities. The company's capital was then increased to \$5,000,000.

It was determined that grades and curves would be too dangerous for the tremendous speed attained by steam wagons, sometimes almost fifteen miles an hour, and that the road must, as far as practicable, be straight and level. The carrying out of this idea made the new road such a work as a young company in this country, even at this time, would hardly undertake. The nature of the country made it a very difficult task. Tunnels had to be made, bridges built, and the great Chat Moss, a swamp four miles wide, and so soft that cattle could not cross it, had to be drained and levelled in the center and embanked at each end. The soft mud here was from 10 to 35 feet deep. In the thirty-one miles, sixty-three bridges were necessary, and twenty-two of these were built of brick, eleven of brick and stone, eleven of wood and two of wood and stone. Two great tunnels were cut, and the substantial character of the work upon these is shown in illustrations. Both were lighted throughout with gas.

The whole construction of this road is enough to make a modern railroad man pen his eyes. Besides its sixty-three bridges, two long tunnels cut through rock, four miles of swamp filled, and excavating or mounding over almost the entire line, crossing at grade had everywhere to be avoided. The tunnel by which the road entered Liverpool was a mile and a half long. Midway between Liverpool and Manchester the valley of the Sankey was crossed by a great viaduct supported on nine arches, each arch of 50 feet span, and from 50 to 70 feet high. The roadbed was hardly inferior to the best in present use. Wrought iron rails were used, each 15 feet long and weighing 35 pounds to the yard. Some of the sleepers were of wood, some of stone. The stone ones contained four cubic feet each, and were used over eighteen miles of the line. The wooden ties were of oak or larch, and were used principally on the embankments. The roadbed itself consisted of a layer of broken rock and sand two feet thick, one foot being below the ties, the other foot between them. The ties were laid at intervals of three feet, in each tie two holes six inches deep and an inch in diameter being bored, with oak plugs driven into the holes. The rails were supported every three feet on cast-iron chairs, and the chairs spiked to the plugs. With the exception of two inclined planes at Rainhill, where the grade was 1 in 96, there was no greater grade on the whole line than 1 in 850; and no curve exceeded a deviation of 4 inches in 22 yards. This first of England's great railroads was as straight and as level as any road that has yet been built; and its lines would drive a modern constructor to despair.

On the 15th of September, 1825, the railway was ready for its first train. It had cost then \$4,100,000. Stephenson & Co. had for several years been building locomotive and cars for it, and on that day eight engines, drawing twenty-eight small passenger coaches, carried about 600 distinguished guests over the line. The preparations for this event had created the first railroad furor that England ever experienced, and great efforts were made to induce the King of some of the royal family to take part in the celebration, but without avail.

The newspapers of the day gave glowing descriptions of this opening trip. "Prepa-

rations," one of them said, "were made on a scale of great magnificence to render this a ceremony of no ordinary kind, and some of the most distinguished characters were invited and attended. The Northumbrian, a steam engine of fourteen horse power, took the lead, having in it train three carriages. The performance of the engines was extremely satisfactory until they reached Parkfield, seventeen miles from Liverpool, when they were stopped to renew the feeders and to take in a fresh supply of fuel. Here several of the company alighted from the different carriages, and on starting a fatal accident happened to Mr. Huskisson, which after a few hours of extreme agony terminated his life."

On the following day the Northumbrian left Liverpool with 130 passengers, and arrived at Manchester in one hour and fifty minutes. In the evening it returned with twenty-one passengers and three tons of baggage in one hour and forty-eight minutes. On the 17th of September six carriages began running regularly between the two cities, the time averaging about two hours. Two months later an engine with no cars attached ran over the line in one hour, with a stop of two minutes midway to oil the machinery. This tremendous feat led an English newspaper to say, "If only ten years back it had been said that persons could pass without inconvenience and without danger over a distance of thirty-one miles in one hour, the tale would have been treated as one of those visionary stories which in former days were the amusements of the nursery."

In the first ten weeks of its existence this road carried 70,000 passengers, but it was not until December of the same year that the first freight trains were started. On the 4th of December, 1830, the Planet locomotive took the first load of freight from Liverpool to Manchester. Eighteen cars or "waggons," were attached, carrying 200 barrels of flour, 34 sacks of malt, 63 bags of oatmeal, and 135 bags and bales of cotton, the cars and their freight weighing eighty tons. On this trip the average speed attained on a level was twelve to fourteen miles an hour, and the journey was made in 2 hours and 54 minutes, including three stops of five minutes each. "This," says a newspaper of the time, "was the greatest performance heretofore accomplished by any locomotive power."

But this great feat was soon to be outdone. By the 25th of the following February a new and more powerful engine, called the Samson, was in the field, and a train of thirty loaded "waggons," weighing 164 tons was drawn from Liverpool to Manchester in 2 hours and 34 minutes, the engine consuming 1,376 pounds of coke in the trip.

This earliest of all the great English railroads was a marvel in construction; but the practical railroad man will ask, "did it pay?" It did, from its first day. In the second half of 1832, when it was two years old, it carried 86,842 tons of goods and 39,940 tons of coal, besides 182,823 passengers—and this large number of passengers was 74,000 less than it carried in the first half of that year. The total receipts for the half year were £80,902; expenses (including interest and all other charges), £48,218, leaving a net profit of £32,683 for the six months. In its first two years and a quarter the road made a net profit of £145,509.

It was this line that turned the tide of public opinion in England in favor of railroads. Within four or five years the foundations of nearly all the great railways of England were laid. And a great many foundations were laid that were never built upon. By 1846 Parliament had passed 272 acts, authorizing the construction of nearly 5,000 miles of railroads. Most of these roads, of course, were not built.

### Gold in Africa.

Hardly a doubt remains that Africa is about to become easily the greatest source of the world's current gold supply. Many good authorities think that the Transvaal region alone will lead either America or Australia in 1893, and it is believed that not less than a billion dollars' worth of gold will be obtained from the fields already discovered. The wonderfully rich but limited area of which these estimates take account does not by any means, however, include all of the gold-producing territory in South-eastern Africa. The latest reports from the prospectors at work in Mashonaland, a region fully 60 miles northeast of the Witwatersrandt field in the Transvaal Republic, agree in regard to the extraordinary extent and productiveness of the gold deposits known for some years to exist in that part of Africa. British companies are preparing to undertake the development of the Mashonaland fields on a large scale, and as the region is not very remote from the sea, and is inhabited by natives not at all dangerous or difficult to deal with, the now famous Transvaal mines are likely to have a formidable rival within a short time. Altogether the prospect is that South Africa will yield not less than \$50,000,000 in gold in 1894, against perhaps \$34,000,000 in America and as much in Australia. This will mean an increase of fully 25 per cent in the total annual product of the world, as compared with 1891, and of about 20 per cent. over last year's yield. Such a gain cannot fail to tell soon upon the relative value of gold and other commodities, including silver, and thus bring about some measure of the change in the purchasing power of money which has been so earnestly sought by opponents of the gold standard. Stranger things have often happened than the solving of the currency problems of the day by the gold miners of hitherto insignificant regions of South Africa.

The tail of the beaver gave the hint for the trowel of the mason.

Director General Davis, of the Columbian Exposition at Chicago, shows by an elaborate statistical table that the enormous sum of \$33,000,000 has so far been devoted to the World's Fair by the exposition company, the United States Government, the States and foreign governments. This total is exclusive of the expenditures of exhibitors and of the heavy investments in temporary hotels, side shows, and similar World's Fair preparations. Altogether the exhibition which was opened with much pomp on Monday by President Cleveland represents an outlay probably exceeding \$50,000,000, or enough to build a handsome city of 50,000 inhabitants complete in every part, and well supplied with public buildings. Surely the Columbian Exposition ought to stand out among other international exhibitions somewhat as Columbus himself does among discoverers.

## HOW MONARCHS TRAVEL.

Great Preparations for Their Safety and Comfort.

Queen Victoria's Beautiful Railway Carriages—The Gorgeous New Train of the Young German Emperor—Extraordinary Precautions Taken by the Czar—How Other Crowned Heads Go Visiting.

History and tradition tell us of the stately pageants and ceremonies which characterized the transit of reigning sovereigns in the olden times, and even of the pomp with which their Ambassadors went on their missions. We have heard of the long retinues, the sumptuous equipages, the mounted escort, the terminal train of sumpter mules, and luggage carts laden with every species of travelling paraphernalia. The outlay necessitated by the visit of one monarch to another was enormous, and only rivalled by the cost of his reception at the friendly court. But these occasions were few and far between, and it is very doubtful if the less ostentatious, but more frequent journeys of the kings and queens of the present day do not sum up in the end with a nearly equal figure.

The Emperor of Germany is perpetually on the move; the Emperor of Austria passes continually to and fro between Vienna and Budapest, while his consort travels all over the Continent.

IN QUEST OF HEALTH and oblivion; the Czar visits the distant provinces of his empire, and regularly goes to Denmark; the Queen of Sweden resorts to foreign watering places; the King of Italy shows himself in all the former capitals of his united dominions; the Queen Regent of Spain takes her delicate little son to San Sebastian, and the Queen of England never tarries long at Balmoral, Osborne, or Windsor, and has of late years made it an annual practice to cross over to the Continent.

With much greater freedom of locomotion sovereigns are yet bound to observe certain formalities in their journeys. In principle, they travel only by special trains, and have their own imperial or royal carriages built and kept up with exceeding care and always ready for use at the shortest notice. The railway carriages used by the Queen of Great Britain in England and Scotland are marvels of perfect construction and arrangement. They are fitted with electric light, upholstered, furnished and decorated in perfect harmony and taste. She can write, read, work, converse, take her meals, and sleep almost as easily and comfortably as in any of her royal residences; even her favorite flowers and the many family photographs she loves to have about her are disposed in different compartments of her carriages in the exact places she is accustomed to see them at home. The train always slacks speed as soon as she retires to rest, and it is well known that she never seems to feel fatigue or discomfort from a long night journey. All her heavy luggage, the horses, the attendants of her bedroom, are sent on several days ahead, so that her apartments are quite ready to receive her on her arrival.

She owns private carriages in France, left in charge of the Compagnie de l'Ouest and despatched to Cherbourg to meet her when she leaves the royal yacht; these convey her to Biarritz, Grasse, Hyeres, or Italy, as the case may be without change. The royal trains are built so as to travel on every European line of rail, with the exception of the Russian and Spanish ones, where

FOR MILITARY REASONS

the gauge is a trifle broader than elsewhere. Each portion of the line assumes the responsibility of the royal train as long as it travels on its radius. The Government, officially informed of the intended journey of the sovereign, even if he travels incognito, notifies the respective companies of the line of route. The companies in their turn give instructions to their staffs of the hours of arrival and departure of the train, and they agree with each other as to the best manner of concordance. When this is satisfactorily settled a plan is drawn up with the minutest particulars of time and sent to the Government, which forwards a copy to the Minister or Ambassador whose sovereign is about to pass over the territory. When the moment arrives the chief engineer of the company, and frequently the director, is at the station to receive it; the engineer of the line enters a carriage, and the first mechanic of the road boards the engine. The whole extent of the line has been previously carefully examined so as to guard against delays and accidents.

Queen Victoria travels with less state than any other crowned head, with the exception of the Emperor of Austria, who in this, as in all else, has a deep-rooted dislike to pomp and representation. Franz Joseph is only accompanied by his military suite; if he retires to rest at all, it is on a narrow camp bed, but as often as not he spends the night sitting up dressed in a corner of the carriage.

William II. has had a train recently constructed on the most luxurious scale, and really seems to be the apogee of railway-coach building. The one which took him across the St. Gothard to the silver wedding of the King of Italy is composed of thirty carriages. He intended to pass incognito through Switzerland; nevertheless, the authorities did their duty in a minute survey of the line from Basel to Chiasso, and a whole body of Swiss officials accompanied the train as long as it remained on the territory of the republic. In Italy the

BRIDGES AND TUNNELS

were guarded by military detachments; an inspection train preceded the royal carriages to clear the way. A force of police and gendarmerie were on duty at every station, and a body of German police went to Rome to concert with the Italian police on the precautionary measures taken during the Emperor's stay.

Never before has William II. travelled in such state, nor has there been such watchfulness exercised. The Empress brought with her three maids of honor, three ladies in waiting, her Mistress of the Robes, two Chamberlains, and seven body servants. The Emperor was accompanied by three high dignitaries of his court, seven Generals two Admirals, the head of his private Cabinet, the Minister of Foreign Affairs, four Geheimraths, his physician, Dr. Lucanus, and a large staff of servants.

A considerable degree of anxiety was felt both in Germany and Italy with regard to this visit and the safety of the visitors, an anxiety not allayed by the recent dynamite outrages in Rome and the knowledge that

the Triple Alliance has some desperate and fanatical enemies in Italy.

The Czar, however, is the ruler whose journeys necessitate the most stringent measures of prudence. Under Alexander II. troops used to be posted at short distances along the line from St. Petersburg to Moscow and from Moscow to the Crimea. The imperial train was divided into two sections, following each other at a few minutes' interval, and it was never known with any certainty into which portion the imperial party had taken their seats. It was to this precaution that

THE CZAR OWED HIS ESCAPE

in the cruel catastrophe which blew up the first started train near Moscow when he was in the second. Since the outrage of Borki fresh orders of precaution have been given. Where formerly a soldier stood every hundred yards now there is one at every fifty along the endless line of rails across the immense continent of Russia, necessitating the movements of a whole army corps; this service works with admirable precision and celerity. The imperial carriages are "iron clad," and within, extremely comfortable, replete with every possible accommodation, bedrooms, bathrooms, sitting and smoking saloons, an excellent cuisine and a perfect system of heating and ventilation. Nevertheless the imperial party never enters one of these trains without the secret apprehension that their lives are in jeopardy and at the mercy of the murderous sectarian.

In the French republic the President like wise travels by special trains boarded by the Chief Engineer. M. Carnot is not at all averse to ceremonial state, but N. Grevy made no other claims on the companies than the assurance that they would convey him free.

Napoleon III. had saloon cars of extreme elegance and exquisite taste. His train was preceded by a single engine, and the stations were occupied by only a few policemen and a small contingent of soldiery.

Nominally all through Europe the railway companies are supposed to make no charges for the transit of royal trains, and to undertake at their own cost the extra expenses which it entails; but as a fact they are gainers by the royal journeys, as they receive important gratifications, rich presents, and not unfrequently distinction in the shape of orders or advancement. Setting apart the actual cost of building and keeping in repair these magnificent trains the sums disbursed, even on a comparatively short journey, appear fabulous and disproportionate, but even those who, to flatter the masses, cavil at the waste of money, would be the first to accuse the sovereign of meanness if he attempted to curtail the expenses when receiving or visiting a brother potentate.

### HOW CHOLERA IS SPREAD IN INDIA.

Through Lack of Sanitation and the People's Peculiar Habits.

A plain story of the conditions that prevail in India for the spread of the cholera was told recently by Dr. Pauline Root of the Woman's Medical College, Philadelphia, who has lived for eight years in southern India. Dr. Root began by describing the conditions under which people live in southern India in order to show exactly what circumstances generate the cholera. There is absolutely no sanitation there, as we have it. Drainage, with the exception of a fever breeder in the way of an open sewer, is unknown. In the villages people live in low mud huts, where all the family congregate in one room, the dimensions of which are likely to be 4 feet by 10 or 12 feet. As there are no outbuildings at all, there is no way in which persons can protect themselves against the cholera if it once appears in such a household. Sometimes if the well runs dry stagnant water must be used. A high caste personage will not allow a low caste to use his well.

Commonly, people go to the river for water. As the water is frequently not on the surface, a "tub" is dug in the river bed and the water allowed to collect. At this tub, or at the well, all the functions of bathing are performed. First the jar is filled, and the water being dashed over the person soon trickles back to its source. In the case of certain religious enthusiasts, water is poured over the body fifty times. Next the Seely, the single piece of silk or cloth which is worn as a garment, must be washed. This is dipped into the pool. Finally, the jar is refilled and carried home. The quality of the water by the time the jar is refilled is promising, indeed, when cholera is in the air. In these river tubs the clothes are washed. The cattle are taken there to drink. Dr. Root said that in sending a man to the river to fetch water there was never any certainty that he would not fill his jar with the water standing in one of the pools, instead of digging a fresh hole. The very cleanliness of the people, and they are extremely clean, tends to the spread of cholera, because their method of bathing is so unintelligent. In southern India there is always more or less cholera. It is often prevalent after a certain religious festival—which is celebrated by an encampment in the river bed for four or five days.

As for facilities in caring for the sick in India, Dr. Root graphically showed how forlornly poor these are by describing her experience in the house of the Vice-President of the municipality of Madua, a wealthy man, who arrayed himself respectfully when he came to ask her to visit his wife, thus showing his solicitude for his wife's condition. Undoubtedly he meant to do the best he could for the sick woman, for the doctor found her in a room adjacent to her husband's—a position of honor. The woman was badly crippled and only able to crawl down from her cot. Beyond playing with the children and polishing the jewels nothing relieved the monotony of her day. She was entirely uncared for. A hole in the wall for refuse was cleaned only once a day. The woman died of blood poisoning. And this is the way a sick person fared in one of the better houses! Usually a sick person is placed in a room that is reached from the house by crossing a court and passing through an alley. The alley usually has black, slimy water in it. The room is seven feet square. In the court are often found the cow, chickens, and a number of persons. No wonder that, under such conditions, cholera spreads like wildfire. But cholera is always brought. It never starts of itself.

Geologists consider kerosene to be animal oil. Hence what we burn in lamps is the remains of long extinct monsters of the earth.

## SAVAGES OF THE UPPER AMAZON.

Strange Stories of the Jivaros, the Apaches of Ecuador.

O. T. Baron, an enthusiastic scientist of this city, recently returned from Ecuador with a collection of beautiful butterflies, birds, and queer trophies of the natives. It was in pursuit of scientific specimens that he lived for years among the Jivaros, an interesting tribe of savages along the banks of the upper Amazon.

"White men never venture into the wilderness," said he, "except to collect rare orchids or butterflies or birds. There is nothing else there worth carrying away, and the climate is exceedingly hot. As for the people themselves—well, even the Indians of the west and upper Andes shudder at the name of a Jivaro. Where I travelled among them is almost as far from the Pacific coast as Nevada is from San Francisco across the mountains. That is the country where the Amazon has its source in the Cordilleras. You will generally find the Jivaros along the rivers. There are no roads nor trails. Nature is so vigorous and luxuriant in that hot and moist region that trails would be covered with a vegetation in a few months. So the natives do the next best thing to following paths—they take to the rivers. With all their savagery it is astonishing how splendidly they make canoes with an old axe carried over the Andes from some distant trading post. They don't understand metals. But with the coca bean as an article of merchandise they go hundreds of miles and return with metal spear heads, hatchets and knives.

"They cultivate plantain, banana, mango root, and live on them with the game they get. Their staple in game is a species of wild hog that lives in the darkest and thickest places of the forest. Hunting this hog is sport for the Jivaros. Men, women, and children take part in the hunt. When a hog is sighted they give chase and nothing can retard the hunters' progress. They crowd through jungle, squirm through brushwood, all the time keeping pace with their dogs, and going as fast as a white man could in the open. On all other occasions the women remain at work in the houses and plantations."

Mr. Baron has a full dress of a Jivaro warrior, given him by a young doctor doomed to death by his people for allowing three patients to die. The Jivaros run very exclusively to earrings in their costumes. The earrings are suspended from a bit of cane passed through the ear. They consist of four long pendants of beetles' wings of glistening green, gold, and purple, strung so as to form a pretty tassel. The brilliant scarlet and orange feathers of the resplendent toucan are used for fringe. The arrangement of color shows remarkably good taste.

"The women are not so elaborately provided with earrings," says Mr. Baron. "Their sole ornament is a stick passed through the lower lip.

"One of the most interesting things I saw there was killing monkeys. You see it takes 5,000 monkey teeth to make a necklace. The savages move along noiselessly, like snakes in the grass, and at sight of a monkey through the foliage they blow a tiny poisoned arrow through a pipe at him. Poor Mr. Monkey is hit every time. He is dead in three minutes. If the air be calm it is dangerous to be within a hundred yards of a Jivaro armed with these miniature weapons, for he can blow a poisoned arrow and kill at that distance.

"Poison is also used in catching fish. The Jivaro is not bound by game laws or Fish Commissioners, so he takes large quantities of poison from the varvasco plant and throws it into the river. Then for fully twenty miles further down the stream fish are gathered in canoes from the surface of the water. They are only stupefied by the narcotic. The Jivaro cares nothing for sport so long as he can get the food. You never meet him without his lance poised and ready for his mark. He carries it above his shoulder, swaying back and forth with every step he takes. Even when standing he keeps his right arm moving—always ready to strike. The Jivaro warrior is like a sentinel in war time. He is taught when a child that he must be ever on the alert to defend himself, and so you see him prodding his lance at your face without any reason. I was going to shoot on my first experience of this kind, but my guides explained and smiled at my inexperience. I laughed, but I laughed alone. In all my experience with the savages I don't remember having heard one of them laugh.

"They have no religion. They worship nothing, though they believe in dreams. When well supplied with chicha, an intoxicating liquor, they dream of killing their enemies. Their doctors are the actors, medicine men, and fakirs of the savages along the upper Amazon. Their existence is like the butterfly's, pleasant and sunny at first. Free chicha and conquests in love affairs, are among their perquisites. When anybody is sick the family get a great quantity of chicha and call in the doctor. He at once proceeds to decrease the supply of liquor. When almost drunk he sings, dances, and goes through a hideous gamut of incantations. Then he looks at his patient and sucks the affected place industriously. He spits out a spider.

"How do you feel?" he asks.  
"No better."  
"He sucks again, and spits out gravel or a thorn."

"The same question is repeated, and each time the doctor brings forth a scorpion, or lizard, or monkey's tooth, until the patient imagines there is some improvement and says so.

"If the first patient dies the doctor is suspected of being a witch; the second time he is declared one, and the third time his own life is in danger, so much so that his own brother will assist in killing him. This very thing came under my own observation, and it was from one of these unfortunates that I got this dress and these ornaments. The condemned man gave them to me shortly before he was killed.

"Nearly every museum has one of the Jivaro preserved heads. They are great curiosities. The warriors decapitate their victims in warfare and keep the heads as ornaments at their girdles. How these heads are preserved is a good deal of a mystery. The skull is removed and skin and flesh treated with extracts from plants, which contract and tan them. Then the hollow head is filled with hot pebbles and dried. The pebbles are removed and a strange object the size of a man's head remains."

But the dead face is horribly real.

The largest cave is the Mammoth Cave of Kentucky.