

## SUSPENDED RAILWAY SYSTEMS.

The subject of rapid transit is now attracting great attention in many of the large cities of the world, including Paris, Berlin, Boston and New York. Among recent projects for urban transportation is one in which the cars are suspended and the motive power is electricity. In this form of aerial railway a derailment would be practically impossible, the center of gravity being very low.

M. Langen has designed such a road for Berlin and other places, and the system is adapted both for ordinary rapid transit or for high speed service, for he considers that the enormous speed of 186 miles per hour may be attained. We give some illustrations of his design. Figs. 1 and 2 show an elevation and sectional view of the electric motor and its mode of attachment to the car. The derailment of the wheels is prevented by the friction plates. The wheels are secured to the motor case in the usual way and are supplied with springs to take up shocks. The car is fastened to the motor through the medium of a center pin, *e*, which permits of a certain amount of lateral play. The car is suspended by springs which render riding easy. Each truck has four wheels. Each car is provided with two motors as shown in Fig. 5. Each truck is also provided with brakes which seize the rail at both the top and bottom.

In addition to the invention of the passenger car, M. Langen has designed an inspection car, which is suspended in the same manner but has only one electric motor. On the other truck is a gas or petroleum motor which actuates the running gear if the supply of electricity fails. If the motors of the cars or the supply of electricity should fail, owing to a break in the line, the passengers can be conveyed to one of the cars of the other line. The expense of the new system is not as great as in most other schemes for aerial transportation. The cars make comparatively little noise and curves are passed with ease. The girders which support the tracks are constructed on the cantilever plan and are secured to columns, various styles of which have been devised to suit the conditions of the streets on which the railway is to be built, as a single column and double column support. Fig. 5 shows the trial line which has been erected at Deutz, which is across the Rhine from Cologne. Fig. 6 shows a design for the suspended electric railway intended for a crowded Berlin street. The cars seat fifty persons each and access to them is gained from stations which are built at convenient intervals. The current is supplied to the motors by three wires which are carefully insulated and protected from contact with other wires. The current is supplied on the well known block system, and if a car should be temporarily stopped between stations, there is no chance of the next car colliding, as no electricity is supplied to the block following the one where stoppage occurs until the car which has stopped has left the block. An electric brake is also automatically applied.

The first concession which has been given to the promoters of the Langen system has been granted by the cities of Elberfeld and Barmen. It is decided to build within a year an aerial line between the two cities. The contract was signed toward the end of the year 1894. For our engravings and the foregoing particulars we are indebted to the *Revue Universelle*.

Coming now nearer home, we will give a few particulars of the system proposed for New York City and vicinity by Mr. J. R. Hawkins, of Mount-ainville, N. Y. It is a very

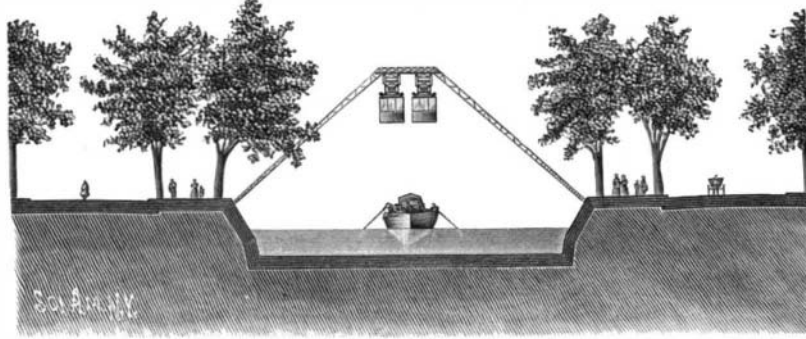


Fig. 3.—THE CARS SUSPENDED OVER A CANAL.

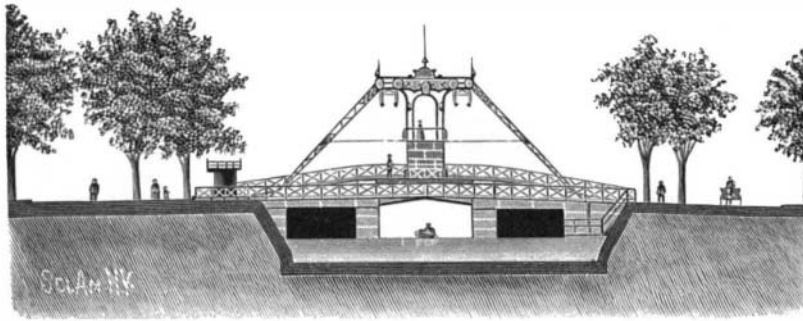
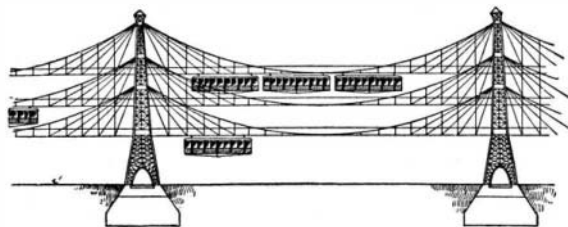
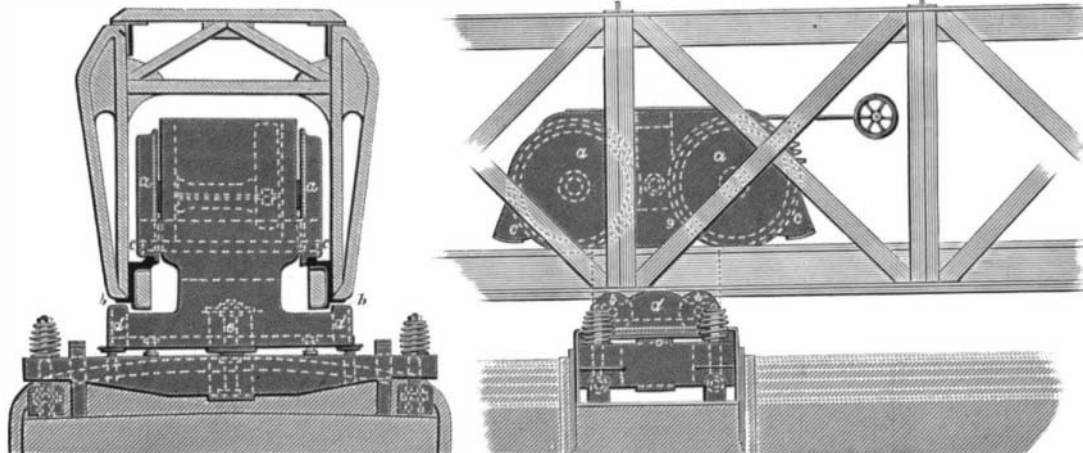


Fig. 4.—THE RAILWAY AT A FLOOD GATE.



TRIPLEX SERVICE RAPID TRANSIT SYSTEM.



Figs. 1 and 2.—ELEVATION AND SECTION OF THE ELECTRIC MOTOR.

comprehensive plan, specially designed to meet and accommodate the great and rapidly increasing population of this metropolis. He designates it the Triplex Service Rapid Transit System. Suitable piers or towers are located at intervals, from which several independent

tracks are supported on the suspension plan, and from trucks on these tracks the cars are suspended. The cars of the different tracks may run at different speeds. The lower line of cars is intended to accommodate the

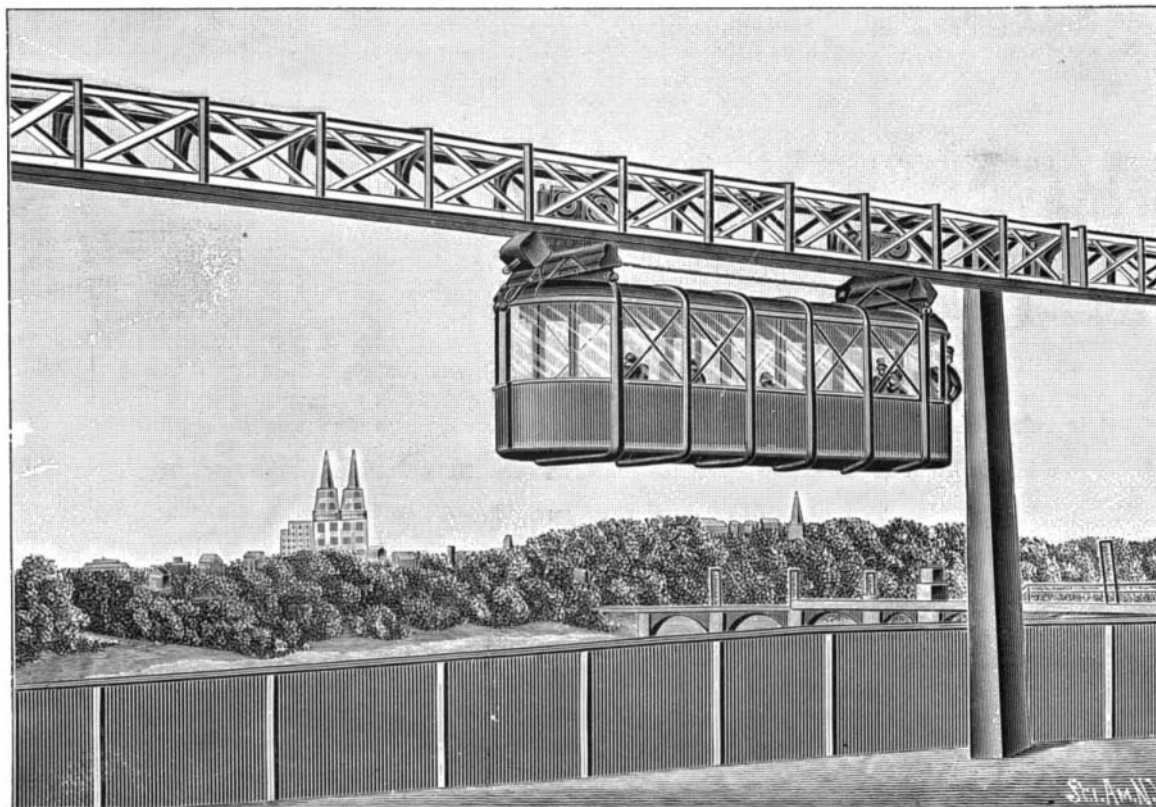


Fig. 5.—SUSPENDED ELECTRIC RAILWAY—TRIAL LINE AT DEUTZ, NEAR COLOGNE.

street travel, and the cars will be suspended, say 16 feet above the surface of the ground, suitable places with steps being provided where the cars stop for passengers. The inventor says: The passenger does not have to step in front of a passing vehicle, thus endangering life, does not have to wait for a vehicle to pass; and the car, when boarded, does not have to wait for any obstructing vehicle to pass or get out of its way while running, and is ready to proceed at once when boarded, and can continue its journey with unabated speed, until a passenger is ready to board or land, thus saving from ten to twenty per cent of time, besides the saving of time to all other traffic, by leaving the street almost entirely free for all other vehicles.

The three roads combined, of the suspended triplex system, can be built to carry twice the number of passengers that all the New York roads combined can at the present time accommodate, while the cost of construction will be comparatively small.

## Bilge Keels.

Sir William White, K.C.B., LL.D., the Director of Naval Construction, was the author of a paper entitled "Notes on Further Experience with First-class Battle Ships," which was read at the recent meeting of the Institution of Naval Architects. In the course of his paper, Sir William said that, as an experiment, the *Repulse* had been fitted with bilge keels, so that she might be tried in company with sister ships belonging to the Channel Squadron. These keels are about 200 feet in length and 3 feet deep.

The *Resolution* (without bilge keels), by orders from the Admiralty, had been purposely kept in very nearly the same condition of stability as the *Repulse*. Comparing the returns from these two ships, it appears that the *Resolution* on one occasion reached a maximum inclination to the vertical of 23°, whereas the *Repulse* never exceeded 11°. The mean angles of oscillation were, of course, considerably below these maxima—probably about one-half. The Royal Sovereign and Empress of India were also in company. The condition of coal stowage in these two ships at the time gave them greater stiffness and a quicker period, which, under the conditions of weather and sea, caused rather heavier rolling than in the *Resolution*. In view of this experience, although the trial was limited, and not representative of many conditions occurring at sea, it was decided to fit all the other ships of the class with bilge keels similar to those which had proved so effective in the *Repulse*. This work was completed for the ships of the Channel Squadron during their annual refit last summer. It has since been carried out in all the other ships of the class.

On the cruises of the Channel Squadron which have taken place since bilge keels were fitted there have been but few opportunities of obtaining proof of their practical value. So far as experience has gone, however, there is a consensus of opinion among officers in command that rolling has been greatly reduced by the bilge keels.

As regards the influence of bilge keels on speed, the practical test of actual service proves that there is no sensible reduction in speed for power, or material increase in coal expenditure for a given speed, at a given draught, and with the bottom in similar condition.

A TEXAS hailstorm on April 24 made sieves of frame houses, blockaded the Great Northern Railroad, and killed large numbers of live stock. The hailstones are said to have been as large as hen's eggs.



**English Locomotive Cabs.**

Writing to Engineering (London) Mr. Clement E. Stretton severely criticises the English practice of depriving locomotive engineers of all shelter from the weather while engaged in the performance of their duties. He says:

The recent collision at Binegar, which was caused by the driver and fireman trying to obtain shelter upon a bitterly cold night when running tender first, should be the means of obtaining far more protection for engine drivers than they at present have. Unfortunately several locomotive engineers appear to still hold the old opinion that "to provide a comfortable cab would render the men careless," and also add to the cost of the engine. The wishes and requests of the engine drivers and firemen to be provided with better cabs, and also that those engines which regularly are working tender first should be provided with weather boards upon the tenders, seem to receive very little attention, for nothing has at present been done to provide better protection to drivers generally.

Probably no greater difference in "cabs" can be seen than in the various engines working over the metropolitan lines, where the engines of one company will be found to have a complete "cab" and shelter provided for running in either direction, but the engines of another company have no covering whatever over the men. There is no possible reason why various engines, performing the same service, should be so differently constructed, nor is there any reason why the American engine driver should be able to perform his duties in comfort and yet that the same protection should be refused to the English driver.

**SPORTING OXEN AND BUFFALOES.**

A correspondent of the Graphic, London, writes from India: Some years ago a friend of mine, known in the district as J. J., was manager and part owner of a Behar indigo factory. Being short of factory oxen, he purchased from some natives a number of buffaloes to work in the plow. Among this draught was a full grown bull which was of such a savage and morose disposition that the natives could do nothing with him — he would charge them again and again, and could only be approached by jamming the herd in a mass round him in the "Bail-Khana," or bullock house. J. J. was rather a good hand at breaking in "Cutcha" horses; the fancy took him to try and tame the bull buffalo. So he told his "jemadah" to have the animal securely fastened in the shade of a large peepul tree which grew in the compound in front of his bungalow veranda. Then he forbade any of the servants to go near, and took the entire charge of the "bisa" himself. For a long time he fed him very sparingly, and whenever he was passing the peepul tree he would go near and talk to the bull in a full deep voice; sometimes using very flowery Hindostani, in which he made frequent allusions to a defamatory character to

bull buffaloes in general and the direct ancestors of this one in particular. These remarks were often emphasized by recourse to a rather heavy bamboo "lathi" which was kept handy. The animal would charge J. J. in the most savage manner, but as he was securely fastened to the tree, and his trainer took good care to keep some little distance beyond the end of his tether, these onslaughts were of little avail. Moreover, they were always met by a sharp crack on the nose by the aforesaid bamboo. Soon the "bisa" began to awaken to

the folly of this mode of procedure, and contented himself with merely shaking and tossing his head. Then J. J. took up the attack, walking round and round the tree, shouting loudly and calling Mr. "Bisa" all kinds of names! After this some canes of the succulent sugar plant were introduced, and the poor beast, being in a very low condition, soon learned to take them out of his master's hand, though showing some shyness at first. In course of time he would allow himself to be patted, and eventually became so tame and fond of his

every cent I had in a gold mine venture. In all the counties bordering on the bay, and in fact all along the coast, wild geese occupied the wide and open plains by the hundreds of thousands. I have seen more than a thousand acres of these big fowl pasturing in a solid block, and that many cattle feeding couldn't have cleared the grass away as completely as those geese did. I heard that the killing of these geese for market had grown to be a great industry, and that some men were getting rich at it. Ranchers were also

offering a bounty for the geese, as cattle raising was becoming an important business, and the geese preempted so much of the pasture area that the loss was serious to the cattle men. I scraped enough money together to buy a gun, and abandoned gold mining for goose hunting.

"When hunting for wild geese on those plains first began, the hunters were able to crawl up on them as they fed and get within easy gunshot. But the geese soon got on to the sportsmen, and by and by no one could get within half a mile of a flock. Hiding in grass blinds was tried and worked well for a time, but the cunning geese sized the blinds up at last and wouldn't come anywhere near a bunch of grass. So something had to be done. Some one had noticed that cattle feeding on the plains could crop the grass almost on the heels of a host of geese, and the fowls took no notice of them. He had an ox that was even

tempered and accommodating, and one day he turned it loose and let it feed along toward where a tremendous flock of geese were pasturing. Now and then he'd hurry the ox up a little, walking close to it on the side away from the geese. By and by the ox got close enough to the geese to satisfy his owner, who stood still until the ox had passed on out of the way. Then he emptied one barrel of his gun into the flock on the ground and gave it the other as the birds rose. He picked up sixty-two geese. The ox was somewhat surprised, but didn't object to repeating the operation next day, when it was equally successful. Geese were worth a dollar apiece. That was the origin of stalking wild geese with oxen. In less than a month there wasn't a goose hunter along the coast who didn't have a goose-stalking ox."

**The Toothpick Industry.**

Insignificant articles like the toothpick represent the investment of millions of capital, the employment of skilled labor, utilization of the latest inventions, the consumption of vast quantities of wood, and the operation of a long line of complex activities. These small articles play an important part in the economies of all civilized nations. To stop at once the manufacture of toys and all not really needful articles in these nations would be to put a stop to a large part of the working and producing forces that constitute the origin of civilization. Some European nations live mainly by their work on articles that are really only mere toys and playthings. In the United States we are rapidly adding to our productions all the wares that find favor abroad, while we have

originated scores of novelties in the amusement line that are being sold and imitated abroad. There is in humanity a chord that responds to the touch of frivolity, adds the American Wood Worker, and that chord has enabled the inventors of ingenious nothings to coin fortunes out of their trifles.

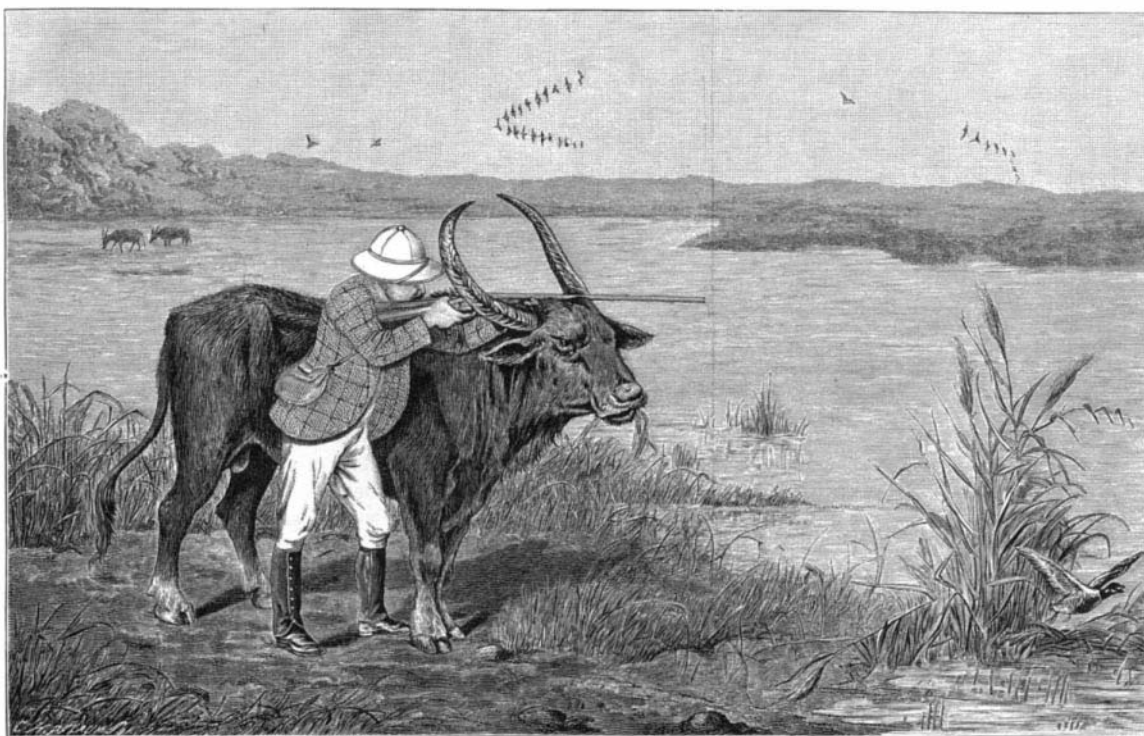
THE eastern hemisphere, on which dwell 92 per cent of the population of the world, has 170,792 miles of railroad, or 46 per cent of all railroads.



Fig. 6.—PROJECT FOR AN ELECTRIC SUSPENDED RAILWAY FOR BERLIN.

master as to leave the herd and come up to the veranda when called, and receive scraps from the table as his reward. Of course he had to do his daily task on the cultivation, but showing himself still uncertain with the native plowmen, the planter devised the plan of utilizing him as an ambush for wild duck shooting, these birds being quite accustomed to the herds of village buffalo which graze along the margins of the jhils and lagoons. After some practice this bull became very steady under fire and enabled his master to make some big bags.

A correspondent of the N. Y. Sun says: "I made a good deal of money in the early days of California, when we used to stalk wild geese with oxen. Stalking geese with oxen may sound a little queer, but that's



A SPORTING BUFFALO.

the way we used to hunt 'em in the early days. A good stalking ox, I want to tell you, was a valuable bit of property forty years ago in California, and we used to talk about him and discuss his points just about the same as sportsmen nowadays discuss the points of their bird dogs. A good stalking ox could earn his owner anywhere from \$50 to \$100 a day if the owner himself was any good, and enjoyed the sport as much as the hunter did.

"I went to California in 1851, and promptly dropped