HISTORY OF ELEVATED RAILWAYS.

The idea of using an elevated railroad for rapid transit is not of recent origin. In 1812, two years before George Stephenson built his first railroad engine, Col. John Stevens, father of the late millionaires of Hoboken, proposed to run a railroad train by steam in almost exactly the manner now adopted on the elevated railroads of New York. He made a proposition to the Commissioners for the Improvement of Inland Navigation, of which Gouverneur K. Morris was chairman, setting forth his plan in detail and giving facts and figures which showed him to be much further advanced in a practical knowledge of the possibilities attainable in rail road travel than any man of the day. He wrote, in February, 1812, as follows:

"Let a railway of timber be formed, by the nearest practicable route, between Lake Erie and Albany. The angle of elevation in no part to exceed one degree, or such an elevation, whatever it may be, as will admit of wheel carriages to remain stationary when no power is exerted to impel them forward. This railway, throughout its course, to be supported on pillars raised from three to five or six feet above the surface of the ground. The carriage wheels of cast iron, the rims flat with projecting flanges, to fit on the surface of the railways. The moving power to be a steam engine, nearly similar in construction to the one on board the Juliana, a ferryboat plying between this city and Hoboken."

The Juliana above-mentioned was built by Mr. Stevens in 1811. She afterward plied on the Connecticut River, having been the first steamboat to navigate the Sound.

It should be remembered that at that time railroad locomotion was little if any further advanced than aerial navigation is to-day. Both practical men and theorists laughed at the idea that an engine could draw a load heavier than its own weight, and the first locomotives were made with a cogged wheel to work in a cogged rail. Mr. Stevens' plan of an elevated road differs little in its general features from the rapid transit roads on Third and Sixth avenues, except that the height above the surface is greater.

Mr. Stevens' theory was a tremendous leap beyond the knowledge of that day. There were tramways in existence in England, but they were used almost without exception for coal transportation, and had never been thought of for passengers. There were steam road-engines also in use, but they were very heavy, clumsy, and slow machines, intended as traction engines over common highroads, and had nothing in them even to suggest the idea of the railroad locomotive of to-day. Nowhere had any attempt been made to run a locomotive on a line of rails. In the light of later progress in railroad construction, Mr. Stevens' calculations are interesting.

He supported his theory of the practicability of such a road by the following reasons: Its expense would be no greater than that of an ordinary turnpike road with a good coat of gravel on it; it could be built in one or two years; its elevation would remove the timber, of which it was composed, from danger of decay; and travel could never be impeded on it by even the deepest snows; it would be free from the casualties to which canals were liable; and the expense of transportation would be far less than on a canal.

The canal question was at that time the one toward which public attention was directed most forcibly, and therefore all of Mr. Stevens' calculations were comparative, the figures of the Commissioners for the Improvement of Inland Navigation being taken as a basis of comparison. The difference in elevation between Lake Erie and the Hudson at Albany being taken at 225 feet in a distance of more than 300 miles, Mr. Stevens treated it as practically a level road. Taking the capacity of one horse on a railway to be only eight tons, the angle of ascent being less than one degree, Mr. Stevens estimated the power of an engine having a cylinder of 10 inches diameter, with a steam pressure of 50 pounds, to be equal on a similar road to 20 horses, or a capacity to draw 160 tons. But Mr. Stevens, to be on the safe side, took 100 tons, at a speed of 4 miles an hour, as the work to be expected from his engine. Then allowing three cords of wood per day at two dollars a cord, and four men's labor at one dollar each per day, and supposing that full freight was carried only one way, he calculated that the round trip from Lake Erie to Albany and back would be made in five days, which at $10 per day would make $50 as the expense of transporting 100 tons the length of the road, or 50 cents per ton. The Commissioners' estimate of the cost by canal was $3 per ton.

Speaking of the speed attainable, Mr. Stevens said: "I am by no means prepared to say what limits may be set to the rapidity with which a carriage may be driven on these rails."

Elsewhere, first referring to the speed obtained by the native boats, or proas, in the East Indies, Mr. Stevens wrote: "If, then, a proa can be driven by the wind . . . through so dense a fluid as water, at the rate of 20 miles an hour, I can see nothing to hinder a steam carriage from moving on these ways with a velocity of 100 miles an hour;" and in a foot-note: "This astonishing velocity is considered here as merely possible. It is probable that it may not in practice be convenient to exceed 20 or 30 miles an hour. Actual experiments, however, can alone determine this matter, and I should not be surprised at seeing steam carriages propelled at the rate of 40 or 50 miles an hour."

The Commissioners for the Improvement of Inland Navigation replied to Mr. Stevens' memorial, making the following objections: That the engine would not draw such a load for lack of a grip on the rails, for if there was sufficient friction for the engine to take hold, there would be so much more friction under each car, and one would overcome the other; there would also be great friction from the flanges used to keep the wheels on the track, which would be greatly increased if the logs should warp; it would be impossible to build a perfectly "true" railroad with ordinary workmen, and even if built it would easily be thrown out of line by frost and other causes; double tracks would be needed, since the same way would not serve for carriages going and returning, and the expense would thus be doubled; and finally, "it [did] not seem probable that a way could be made of sufficient strength."

Mr. Stevens replied to this highly scientific exposure of the Commissioners' ignorance by showing that an engine, theoretically, *would* draw such a load as he had estimated; that the roadway could be made true and maintained so at reasonable cost, and that if wood was deemed too perishable or insecure other materials could be used. He then made a detailed estimate of the cost of such a road, having brick pillars, 400 to the mile, with timber ways and iron bar rails four inches broad and one-half inch thick. He thus made the cost per mile as follows:

Bar iron plates	$7,603
Brick pillars	1,600
Timber ways	1,500
	$10,703
Or, for the whole 300 miles	3,210,900
For reducing elevations, etc	500,000
	$3,710 900

Using stone instead of brick, he added $800 per mile, or a total of $3,950,000.

Mr. Stevens informed the Commissioners that the practicability of his plan could be satisfactorily tested for about $3,000, but whether they thought it too visionary a scheme to deserve attention, or whether their minds were so devoted to the canal project as to be incapable of taking any other ideas into consideration, it is impossible to tell; at any rate they took no further steps and the matter dropped.

Pittsburg's 20-ton Hammer.

One of the largest castings ever made in this country was successfully poured at Pittsburg, October 5, being a solid block of metal weighing 161 tons. Its mission is to serve as the anvil block for a monster steam hammer in process of erection for the Black Diamond Steel Works, Park Brothers & Co., of Pittsburg. The growing demand for steel shafts for Western river steamers was one cause leading to the building of this hammer, whose cost, ready for work, will be $52,000. The hammer frame will stand 34 feet high, the head, piston, etc., will have a dead weight of 17 tons, increased by steam pressure to 20 tons, and the fall is to be 9 feet.

To properly meet these Titanic blows the great casting was made, the dimensions of the anvil block being as follows: Height, 11 feet; at base, 8 by 10 feet, tapering upwardly to 4 by 6 feet. To secure the best results and toughest metal where this was most needed the block was cast with the smaller end down, and when cooled will be turned over by hydraulic jacks, trunnions forming a portion of the casting for this purpose. The foundations for this anvil necessitated the digging of a pit 27 feet in depth and measuring 30 by 50 feet. Cement piles, surmounted by successive layers of heavy timber, a ponderous cast iron plate, and finally by a section of oak timbers stood upright 11 feet high, form the support for the anvil block. The casting was accomplished in seven hours without accident of any kind, the metal pouring from five cupolas charged with 33 tons each of best charcoal iron. Previous to this work, as near as can be ascertained, no single casting of 100 tons had yet been poured in this country. The Rodman Columbiads, 20 inch bore, cast at Pittsburg in 1860, weighed 80 tons in the rough. As to hammers, the largest steam hammer at present in operation in this country is a 10 ton machine at Nashua, N. H. The Pittsburg hammer is being built by Wm. B. Bement & Sons, Philadelphia, and will be in operation early in the coming year. Western river men will no longer send their orders for steel shafts to Krupp, of Essen.

Balloon Photography.

An interesting experiment has recently been reported to the French Academy of Sciences by M. P. Desmarets. M. Desmarets has succeeded in taking two excellent photographic views from a balloon in mid air. Such views have hitherto been obtained by M. Nadar from a captive balloon, but these are the first from a balloon unattached to the earth. M. Desmarets used the instantaneous process of M. Janssen. The plates were very sensitive, specially prepared with gelatine-bromide, and the oxalate of iron was used in developing them. The views obtained are said to have shown a remarkable clearness. The time of exposure was one-fifteenth of a second.

The Distillation of Spirits.

The following statistics are furnished by the Commissioner of Internal Revenue. The figures indicate the number of gallons of distilled spirits produced, consumed, exported, etc., the fiscal years ending June 30. The marked increase of consumption the past year is attributable to the revival of manufacturing industries, the larger portion of the consumption of spirits in this country being—as is well known to all except prohibition lecturers—used in the arts.

	1880	1879.
Production	90,355 270	71,892.621
Consumption	61,116,523	51,893.714
Exportation	16,765,663	14,837,581
Balance in bond	31,363,869	19,212,470

The Epidemic of Breakbone Fever in the South.

A painful but fortunately not fatal disease has been very prevalent the past summer along the south Atlantic and Gulf States, from North Carolina to Louisiana, extending into the interior as far as Augusta, Ga. At Charleston, Savannah, and New Orleans the epidemic has been especially severe, the victims being numbered by thousands. Both blacks and whites were affected about equally. For several weeks after the first cases appeared in June the real nature of the disease was not recognized, something like thirty years having elapsed since the last invasion. The symptoms of the disease, as described by Dr. F. P. Porcher, in a communication to the Bulletin of the National Board of Health, are as follows, not all of the symptoms, however, appearing in every case:

The disease generally begins with a feeling of coldness, or by a chill, followed by fever—this, with a temperature ranging from 100° to 105°, lasts generally from 24 to 48 hours, occasionally extending to four or five days, and even in rare cases to seven. Relapses occasional, specially in those who have gone out too early. Headache frequent, generally frontal, from the beginning. Miliary eruptions, sometimes elevated and red, like measles, and the occasional presence of *sudamina over the face, neck, and body;* sometimes the eruptions were confined to the body, and endured for days after recovery. We have seen some examples of slight desquamation—furfurations or branny in character. Sweating profuse in many persons, though *often absent.* Hence, some physicians are inclined to consider the disease to be *suetle miliare* of a mild form. "Breakbone" is the best name, because pain in the bones and limbs is the most constant symptom. There is often great restlessness during the fever, and in some a feeling of tightness or congestion about the throat, with bleeding in a few cases known to us. Catarrhal symptoms are rarely present, although cough has occasionally existed. Bleeding from the nose not unusual in children, and also increase in the menstrual molimen has been observed. Pain in the back and limbs markedly present, but no decided swelling of joints, no carbuncular enlargements or boils, as in the epidemic of Dengue, of 40 years since, or in that of "breakbone," which followed some years subsequently. Weakness and prostration have been very decided, but not nearly to such an extent as in previous epidemics. Some of the physicians consider that there has been a tendency to hepatic torpor or congestion, of no great severity, however. Dr. Porcher has heard of no cases of decided jaundice. Nausea and vomiting seldom occur.

Very little active treatment has been used: a mild laxative, saline or mercurial, hot teas, niter, pediluvia, synapisms, etc., and quinine during and after the attack, upon theoretical grounds, with occasionally mild stimulants. Several persons have recovered with no treatment whatever. No deaths are reported. The disease differed from the Dengue of 40 years ago, and also from the later breakbone fever, in that it seldom or never attacked all the members of a household, as was the case during previous epidemics.

A Successful Case of Transfusion of Blood.

The following case, which exhibits in a marked degree the beneficial effects of transfusion of blood when performed in cases of impending death from excessive hemorrhage, is reported in the New York *Medical Journal*, for August, 1880, by Joseph W. Howe, M.D.:

Mrs. B., aged twenty-two years, was delivered of a three months' fœtus, November 7, 1879. From that date until November 11 she had repeated and profuse hemorrhages from the uterus. On the 10th the bleeding was continuous. Drs. Reynolds and Comstock, who were first called in, succeeded in controlling the hemorrhage, but not before the patient had reached the stage of collapse. They remained with her all night, endeavoring, with the ordinary means of stimulation, to rouse her, but without avail. She continued to sink in spite of everything.

On the morning of the 11th I was sent for. The patient was then completely pulseless and partially unconscious. The extremities were cold and clammy, and it was evident that unless some fresh blood were introduced death would soon supervene. She was so far gone that I made up my mind not to spend any time in defibrinating the blood. I opened the median basilic vein in the right arm of the patient and introduced the closed cannula of Colin's instrument, and after passing some warm water through the cylinder of the instrument, attached it to the cannula in the patient's arm. The median cephalic vein in the right arm of the donor was then opened, and the blood was allowed to flow directly into the cylinder without defibrination. When a sufficient quantity had been obtained, and while the blood was still flowing, I injected, without any difficulty, between seven and eight ounces. The whole operation did not occupy more than five minutes in its performance.

Within half an hour the pulse returned at the wrist, the voice became clear and distinct, and she asked for something to eat, saying that she felt stronger and better in every way. One of the medical gentlemen who had been with her all night assisting in the attempts at resuscitation, and who left in the morning, believing that there was no hope of her recovery, came in an hour after the operation, and said it was "a perfect transformation scene"—that he had no idea that a few ounces of blood could restore lost vitality so rapidly.

From that time on the patient continued to improve, and when I last heard from her she was in the enjoyment of good health and attending to her household duties without any discomfort whatever.