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INCREASING THE BRIDGE FACILITIES.

In our issue of October 13, 1883, we described and fully illustrated the arrangements for switching cars at the New York terminus of the bridge. It will be remembered that motion was transmitted to two grip cars permanently attached to two auxiliary ropes passed around drums which were actuated by the main cable. These drums were provided with friction clutches that were operated by levers located upon a platform in the center of the building. One grip car passed up to the end of the incoming track; the other crossed the switch, and passed to the end of the outgoing track. By either of these grips the passenger cars were hauled to the end of the station, whence they were allowed to run to the platform alongside of the outgoing track.

This system has now been in operation since last September, and has proved adequate and reliable, transferring the cars from one track to the other quickly and with a most gratifying freedom from noise. But, although the method gave most satisfactory results, it soon became apparent that much more extended track room was necessary for switching purposes, in order that more cars could be shifted simultaneously during the periods of greatest travel. As the tracks are now laid out, only two cars can be switched at the same time. On the south, or down town, track, the distance from the end of the switch to the end of the track is 107 feet; on the north track the distance between the same points is 101 feet; the difference being due to the angle which the bridge makes with Chatham Street. The large cars are 48 feet long, the small ones 36 feet, and the grip cars 8½ feet, so that a train made up of a long and short car and the grip is 92½ feet in length.

At a recent meeting, the trustees of the bridge adopted

plans for a structure to extend from the end of the bridge across the space formed by the junction of Chatham and Center Streets to the building line on the latter street; and from these plans the accompanying engraving was made, representing the extension as it will appear when viewed from a point just south of the Hall of Records. Under the conditions governing an undertaking like this it is impossible to make a system of tracks, girders, and columns a thing of beauty and a welcome ornament to a neighborhood; but these plans contemplate a structure which, while serving all the purposes for which it was designed, will be as unobtrusive as possible, and which is one of the best, if not the best, that could be built when considered simply and solely from a utilitarian point.

There will be four cross girders: one at the curb line of Chatham Street, one at the curb and one at the building line of Center Street, and one near the center of the crossing. The latter will be perpendicular to the line of the bridge, while the others will be parallel to the streets on which they will be located. Each girder will be supported by two end columns. Upon these will rest eight lines of longitudinal latticed girders, placed 5 feet 7⅞ inches between centers; the distance between the centers of the outside girders will be 39 feet 7 inches. The girders will be 4 feet deep; flange plates, 12"x½"x⅝"; chord angles, 4"x3½"x⅝"; web plates, 10½"x⅝"; diameter of rivets, ⅝". The top chord will be made up of two angles, with a plate between, and on top of which, for the entire length, will be two plates, increased to three in the middle section. The girders will be tied together and braced. The distance from the end of the car platform of the bridge station to the first row of columns will be 26 feet; the south girder, extending from this row of columns

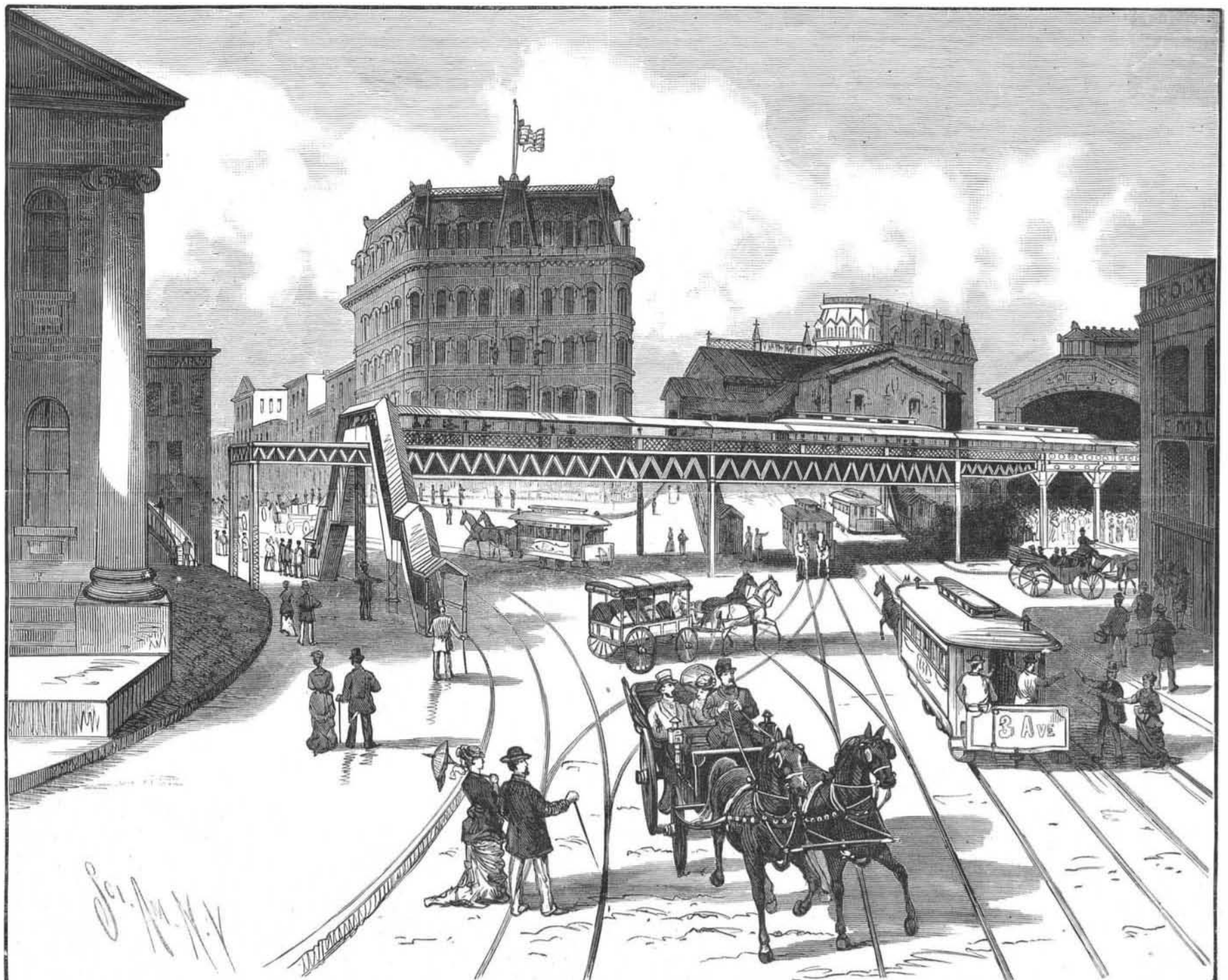
to the center row, will be 45 feet long; the north girder 64 feet 5¼ inches; the south and north girders from the center to the Center Street curb will be 56 and 63 feet; the girders over Center Street sidewalk will be 18 feet. The height from the street to the bottom of the lower chord will be 15 feet.

Two flights of stairs, one upon each side, will lead from the Center Street sidewalk to this platform, thereby allowing passengers from the west of the City Hall to enter the bridge without passing through the moving crowds of cars, wagons, and people in the street. These walks will be covered by an umbrella work similar to those over the platform extensions at the Brooklyn station.

This plan will necessitate cutting off one corner of the elevated railroad station. The stairway leading to the station will be moved from its present position up to a point about on the center line of the bridge, thereby relieving the southern carriageway. The stairway in the center of the street will be turned around so as to approach the station from the down town side. Platforms will connect the bridge with the railroad station, so that passengers going in either direction will not be compelled to descend to the street.

At present it is the design to extend the bridge tracks only to the center row of columns; the increased switching room thus obtained will be about 80 feet. This will give tracks about 190 feet long from the switches to the bumpers, and will allow trains of four cars to be easily handled. The auxiliary ropes can be arranged to do this work, but it is probable that a method (by engines) similar to the one now used at the Brooklyn terminus will be adopted.

The structure will be of ample strength to sustain travel if, at any future time, the bridge should be connected with a west side system of railroads.



VIEW SHOWING THE PROPOSED IMPROVEMENT AT THE NEW YORK TERMINUS OF THE BROOKLYN BRIDGE.

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REMOVAL.

The SCIENTIFIC AMERICAN Office is now located at 361 Broadway, cor. Franklin St.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as 'Act, patent, a novel', 'Alcohol and digestion', 'Belting, leather', etc., with corresponding page numbers.

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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 482,

For the Week ending April 12, 1884.

Price 10 cents. For sale by all newsdealers.

Table listing sections I. ENGINEERING, MECHANICS, ETC.—Testing Chilled Armor Plates, The Armament Question, etc., and II. MISCELLANEOUS.—Speech of Hon. Orville H. Platt, etc.

PATENTS IN CONGRESS.

The most interesting incident of the past few days relating to the patent agitation has been the delivery before the Senate, on the 31st of March, of a most remarkable oration on the "Reorganization of the Patent Office," by the Hon. Orville H. Platt, Senator from Connecticut, and Chairman of the Committee on Patents. We look upon this discourse as one of the most able, eloquent, and profound expositions ever pronounced concerning the nature of patents and the marvelous influence upon the country of new inventions. It is a wonderful essay, powerful in its reasoning, a great honor to its author; entitling him to the gratitude and respect of the nation.

Senator Platt begins at the very beginning of our patent system. He reproduces from the government archives records showing the gradual unfolding of the system, and tells us of the deep interest our fathers took in new inventions and new industries. He proceeds:

"Mr. President, to my mind the passage of the act of 1836 creating the Patent Office marks the most important epoch in the history of our development—I think the most important event in the history of our Government from the Constitution until the war of the rebellion. The establishment of the Patent Office marked the commencement of the marvelous development of the resources of the country which is the admiration and wonder of the world, a development which challenges all history for a parallel; and it is not too much to say that this unexampled progress has been not only dependent upon but has been coincident with the growth and development of the patent system of this country.

Words fail in attempting, to portray the advancement of this country for the last fifty years. We have had fifty years of progress, fifty years of inventions applied to the everyday wants of life, fifty years of patent encouragement, and fifty years of a development in wealth, resources, grandeur, culture, power, which is little short of miraculous. Population, production, business, wealth, comfort, culture, power, grandeur, these have all kept step with the expansion of the inventive genius of this country; and this progress has been made possible only by the inventions of its citizens. All history confirms us in the conclusion that it is the development by the mechanic arts, of the industries of a country, which brings to it greatness and power and glory.

No purely agricultural, pastoral people ever achieved any high standing among the nations of the earth. It is only when the brain evolves and the cunning hand fashions labor-saving machines that a nation begins to throb with new energy and life, and expands with a new growth. It is only when thought wrings from nature her untold secret resources that solid wealth and strength are accumulated by a people.

Concede all you claim—free institutions, Christian civilization, industrious habits; grant respect for law; acknowledge all our vast natural resources; and then deduct patents and patented inventions from the causes which have led to this development, and you have subtracted from material, yes, from moral, prosperity nearly all that is worth enjoying. Subtract invention from the causes which have led to our growth and our grandeur, and you remit us, you remit our people, to the condition of the people of Italy, of Switzerland, of Russia. If "knowledge is power," invention is prosperity.

I am not a very old man, but recollection carries me back fifty years, when there was no railroad, no coal used, no steam power used; no woolen factories except of the rudest sort; no telegraph in Connecticut. Possibly there were one hundred tons of coal consumed in the State annually.

There was no carpet; no piano; few books; hand sewing only; hand knitting; the tallow candle; the unwarmed, unlighted church; the school house with its hard, rough benches; and the slow post route, the mail once a week; a weekly paper only. It was a week's journey from Connecticut to Washington; six weeks' journey from Connecticut to Ohio. Five thousand dollars in those days was a competence, and \$10,000 was a fortune. What has accomplished all the transformation which we witness as we compare the condition of the country fifty years ago with its condition at the present day?

I insist, Mr. President, that it is traceable directly to invention. The railroad, the child of patented inventions, the production of cotton, silk, broadcloth, and linen, is due absolutely and entirely to the perfection of machinery for their manufacture. The daily press, the teeming hocks, are part of our civilization. They are all dependent upon patented inventions. The carpet, the piano, and the carriage conduce to our comfort and our convenience, and they are also children of patents. Every comfort which we have, every convenience which we enjoy, every element of wealth which we acquire, has its root and development in the patent system of this country. They are born of patents, and they live only by permission of patents.

The author then traces the growth of population, of imports and exports, of railways, production of coal, wool, values of agricultural lands, and the same lands where manufactures are carried on; he gives multitudes of statistics and tables; he presents proofs for all his statements.

Every department of business, every pursuit of organized life, has been fed, nourished, and enabled to keep step in this wonderful march of progress by the patented inventions of the age. . . . Imagine, if you can, how we should reach our agricultural regions, the great wheat fields of the West, without railroads; and I may say here that a railroad—from the steel rail to the top of the smoke stack, from its locomotive headlight to the signal lantern on the platform

of the last car—is but one aggregation of patents. Think of the crops raised without improved plows, without seeders, without cultivators, without mowers, without harvesters, without thrashing machines! Think of the crops hauled to market by horses! Think, if it be possible, of the wheat converted into flour without patented milling processes! and say what proportion of profitable agriculture in this country is not due directly to patents and to the patent system of the country. The truth is, and there is no avoiding it, that you cannot disconnect in this country invention, manufactures, and agriculture. The triumph and the success of the one is the triumph and the success of all. They are interdependent, coequal factors, as it were, in producing our prosperity and our happiness; and so with regard to the other industries of the country, patents are directly connected with them all, and absolutely necessary to their successful pursuit.

We are a nation of 50,000,000 people, but we have the productive capacity of many more millions, how many more no man can estimate. Coal and water are now performing the work of human hands. What agents will perform them in the near future it is impossible to tell.

The steam power used in the manufactories of the United States, by the census of 1880, was equal to 2,183,488 horse power; the water power was equal to 1,225,379 horse power; making in all the horse power of the United States 3,408,867. Counting one horse power to be equal to that of six men, we have in the power used in the driving of our factories alone in this country the equivalent of the power of 20,453,202 men. The steam power used in driving our factories, not including the water power, is equivalent to the labor of 13,100,928 men; and of our 50,000,000 people only 35 per cent are supposed to be capable of labor—in round numbers, 17,500,000 laborers, persons capable of pursuing gainful avocations, in the country; and yet it would nearly take these 17,500,000 men to furnish the force that is exercised by steam in driving the engines of our factories, the wheels, the spindles, and the machinery of this country; and we do not begin to touch even then upon the saving of power by the use of the machines which are manufactured in these factories.

Take the capacity of locomotive engines as compared with the capacity of horses. We find that the locomotives in the entire country are doing the work of 29,676,960 horses on common roads.

Remember that eight-tenths of the manufacturing of the country is dependent on patented processes. Take the statement cited the other day by the Senator from Florida [Mr. Call], in which he quotes from Mulhall's Progress of the World, a book from which I have already quoted, as to the capacity of the sewing-machine:

"In effect, the adoption of machinery and steam has given mankind an accession of power beyond calculation. The United States, for example, make a million sewing-machines yearly, which can do as much work as formerly required 12,000,000 women working by hand. A single shoe factory in Massachusetts turns out as many pairs of boots as 30,000 boot-makers in Paris."

Mulhall here gives the total horse power in comparison with steam as 13,071,000, the horse power of the world dependent upon the use of steam, equivalent to about 78,000,000 men.

Take the loom and see what it has done in adding to the productive capacity of the country.

In one of our manufactories you will see a girl of fifteen minding a machine that spins 2,100 miles of thread in a day—a thread that would reach from Washington to California.

Take the figures which I have given of the wool production and consumption of this country. In 1880 the wool grown was 290,000,000 pounds; that imported was 70,575,478 pounds. We exported 4,074,517 pounds, which left for home consumption in the United States 356,500,961 pounds of wool. Now, imagine for a moment what kind of a figure the mothers and daughters of the land would make in carding it with the old hand cards, or spinning it with the old spinning-wheel, or weaving it with the old hand loom. Take the single matter of cleaning cotton.

Under the old process of cleaning cotton, before the invention of the Whitney gin, a man could clean four pounds a day. The gins now in use clean 4,000 pounds a day.

Whenever a machine is invented which does the work of ten men with one attendant, nine men are released from that occupation in which they have theretofore engaged to engage in other productive operation. The men so released do not remain idle, nor do they descend in the grade of labor.

I know the argument is often used that inventions are opposed to the labor interests of the country. It is not true. There is a redistribution of labor whenever a new labor-saving machine is invented, but there is no destruction of labor. There is no degradation of labor in invention. The man released from a particular kind of labor by the introduction of a labor-saving machine does not go down in the grade and scale of labor, but he ascends. He engages in some higher employment, in some more productive vocation, for patents elevate the laborer. New inventions open new fields of labor. The laborer who lives and breathes the air of invention produces more, man for man, than he who does not live in such an atmosphere, for patents are educators.

Property in patents is a property which contains within itself the principle of the reproduction of property, and that