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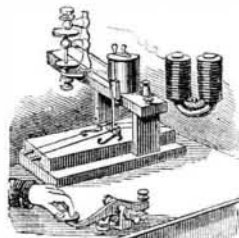
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THE STIMULUS OF THE PATENT LAWS.



UNDER the naked rafters in the upper story of a house in Pine-street in this city, is the room of a man who is a very fair specimen of an American Inventor. His beard is long, his hair is uncut, his person is neglected; but his mind is as clear as crystal. He has

that accurate and positive knowledge of the properties of matter, which is gained by those who come in actual contact with them, either in original investigations of physical science, or in personal practice of the mechanic arts. The man of whom we speak, has been engaged for some years in efforts to improve the process of telegraphing, and neither Faraday, nor Henry, nor any other man in the world has a more thorough knowledge of electricity and electro-magnetism than he has. He first devised a plan for the more rapid transmission and recording of the signals which constitute the Morse alphabet at present in use, by which he was enabled to transmit 15,000 words in one hour, instead of 2,000, the highest number previously reached. On removing the apparatus from his own room, however, and applying it to the line between New York and Washington, he found that the rapidity of the operation was limited by the action of the relay magnets. Accordingly laying aside all other matters, he has devoted several months to improvements in this simple little apparatus. We have never been more impressed with the importance of slight modifications in mechanism than in examining the relay magnet which is the result of these months of study, and contrivance. The one previously in use seemed to be as nearly perfect as possible and so very simple that there was no room for improvement in its construction, but there was a trifling amount of friction in the journals of the rocking bar, and even the almost instantaneous action of a spiral spring, was not sufficiently sudden to make the several letters of 15,000 words in an hour. By an accidental discovery of an important property of springs, which we shall fully describe at another time, by modifications of the helix and better arrangements of the several parts, the action of the relay magnet was so accelerated as to bring it up to the rapidity required, and our inventor had that intense satisfaction—which none but an inventor can appreciate—of witnessing the complete success of his long series of labors and experiments.

He is but one of a large number of persons in the country, whose minds and hands are busy under the stimulus of the patent laws, in eager efforts to effect improvements in the arts which will facilitate the operations of industry, and increase the annual production of wealth. These men neither expect nor ask any reward for their efforts, unless they really produce something of money-value to the community, and even then, all they ask is what they themselves can make out of the exclusive use, for a few years, of their own ideas. After these few years have expired, the community comes into free possession of the fruits of their studies and labors. Supposing the same number of men were employed by an arbitrary government on salaries, how feeble would be their labors compared with the efforts that are called forth by the splendid prizes occasionally realized by successful inventors! No kingly cunning could devise a scheme which would secure, at so cheap

a rate, so large an amount of service to the state as this Republican Law, which was conceived in a spirit of simple justice, as affording a fair, but moderate compensation to those citizens who do the most to advance the prosperity, wealth and power of the country.

PIANOS—A GREAT PIANO MANUFACTORY.

Music—both vocal and instrumental—exerts a most elevating and refining influence. Its power over the human passions is beautifully illustrated in Holy Writ, in the life of Israel's warrior-minstrel—David, before whose strains on the harp the evil spirit fled from the heart of vengeful Saul. In all ages, music has thrilled the heart under almost every circumstance of life—on the field of battle, in the temple and at the fire-side. The ancient harp came down to us as the most suitable instrument for the domestic circle, and it seems to have been the parent of the pianoforte. If we look into a piano and examine the arrangement of its strings, the form of a harp placed in a horizontal position will at once be recognized. It is true the strings of the two instruments are made of different materials, and the mechanism for striking them is altogether different; still, in principle, there is a similarity. The improvements made in the modern piano—its great range in musical execution and its sweetness of tone, has rendered it the chief of instruments, for the domestic circle especially. Its paternity is claimed by several nations, but the testimony presented to us is in favor of Germany being its birth-place. In England it has been more generally introduced among the people than in any other European country, but it is in the United States where the manufacture of such instruments has reached its highest development. Once we imported such instruments from London; now, American pianos have won a superior reputation. The very best operative pianoforte makers of Europe have been attracted to our shores, and their experience and acquired skill have been multiplied and expanded with American spirit and enterprise. One of the most astonishing triumphs in the manufacture of such instruments, known to us, has been achieved by Messrs. Steinway & Sons, No. 82 Walker-street, in this city. The father, who was a manufacturer of pianofortes in Germany for 25 years, came to the New World about 11 years ago; and with his four sons, all practical instrument makers, engaged as journeymen, and thus worked for nearly four years in order to acquire a knowledge of our language, institutions and modes of doing business. Being possessed of some capital, they then commenced business on a small scale, making one piano per week. Now, mark the change. Last week we had the pleasure of going through their new manufactory in Fourth-avenue, in which no less than 30 square and 5 grand pianos are turned out weekly, and the means of supply can barely supply the demand. During the 25 years in which Mr. Steinway, Sr., was engaged in the business in Germany, he only made 473 pianos altogether; now they manufacture 1,620 per annum, or 1,154 more than they made in 25 years in Europe. And all this business has been made in the short space of seven years; a fact which makes it most surprising, considering the great number of other firms engaged in this manufacture. The new factory extends from Fifty-second to Fifty-third streets, occupying an entire block. The building is in the form of the letter L, running 201 feet in one direction and 165 feet in the other. In height it is six stories, with the basement; it is 40 feet in depth. A large court yard occupies the inside space, in which are stored 2,000,000 square feet of lumber; and there is also a kiln where 240,000 feet are always undergoing the process of drying. About 350 operatives are employed on the premises, and all the departments are arranged in the most systematic manner to facilitate the operations.

The rise and progress of the Steinways in manufacturing pianofortes, it will be agreed, from these statements, is enough to excite astonishment; because it is not a speculative business, but a regular manufacturing institution. One cause may be assigned to the great number of pianos sold in the United States; namely, the general distribution of wealth among the people, by which so many families are enabled to purchase such instruments. And another is the very general cultivation of music in families, academies, and even in our common schools, at the present time. These are delightful considerations; because the piano is the best

of instruments for accompanying the voice—in hall, in school or social circle. In the last issue of the SCIENTIFIC AMERICAN, we directed attention to the triumphs which had always been secured by good mechanism in all departments of manufacturing operations. Messrs. Steinways' success is a powerful confirmation of the statements we made in that article. But without original genius also, so as to devise improvements, little progress is made in any manufacture at the present day. The patents secured by any manufacturing company is a very good index of their enterprise and success. Messrs. Steinway have invented several excellent improvements in pianofortes; the patents for which were obtained through the Scientific American Patent Agency, and these have secured to them the just protection and enjoyment of rights and advantages which have proved eminently beneficial in their business.

NIAGARA RAILROAD SUSPENSION BRIDGE

We have received a pamphlet containing a report on the present condition of the above bridge, by John A. Roebling, of Trenton, N. J., its engineer. As this is an international structure, and the greatest railroad suspension bridge in the world, everything connected with its adaptability and durability for such purposes is of great interest to the engineering and railroad professions. This bridge was opened for traffic on the 8th of March, 1855; and the number of trains and trips of single engines which pass over it daily now average 45. This affords evidence of a very great traffic, thus subjecting the structure to the most severe tests. After an absence of two years, Mr. Roebling visited the bridge, and gave it a thorough examination on the 18th, 19th and 20th of July last, and he could detect no change in any of its parts. In order to judge whether the stiffness of the superstructure had been impaired by five years' traffic upon it, he placed a leveling instrument between the towers on the New York side, and observed the process of gradual deflection caused by five trains, as follows:—

A train, composed of the engine "Essex" and tender, of 35 tons weight, drawing 10 empty cars, produced a deflection in the center of.....	0.462 feet.
A small engine, drawing 2 loaded passenger cars, 1 baggage car, and 1 loaded cattle car.....	0.540 feet.
Another light engine, with 5 loaded passenger cars and 1 baggage car.....	0.530 feet.
The engine "Essex" and tender alone.....	0.315 feet.
The same engine, returning with 8 loaded cattle cars, each holding from 17 to 18 cattle of the largest size.....	0.789 feet.

He says:—"By comparing the above observations with those of 1855, we discover no essential difference. The question has been repeatedly asked why trains are not allowed to pass over this bridge at a higher rate of speed than five miles an hour? This limitation is looked upon as a sign of tacitly acknowledged weakness, and has been frequently referred to as a strong argument against suspension bridges for railroad purposes. The first great object of this limitation of speed is *safety*. Although it may look somewhat timid in this fast-going age to see freight trains move at the rate of five miles per hour, and passenger trains at even a less rate; yet, when it is considered that this slow speed insures *absolute safety*, no matter what accident may happen to a train, the traveling community ought to be satisfied with this cautious arrangement."

By an additional expenditure, however, of \$20,000, the stiffness of this bridge may be so much increased as to allow trains to pass over it at the highest speed; but no increase of speed, we hope, will ever be permitted.

There are some very important scientific questions in the course of solution by this bridge. Wrought iron, such as that of which the cables are composed, has been held by many engineers to be an unsafe material for suspension bridges, from two causes. One is rusting of the metal by the oxygen of the atmosphere, and the other is the conversion of the fibrous into brittle crystalline iron by tension and vibrations. Mr. Roebling states that the iron of the Niagara bridge is protected mechanically from rusting by several coats of paint, and chemically, by calcareous cements, which absorb the oxygen in damp situations, and thus protect the anchor bars. He recently examined the anchor bars of the Monongahela suspension bridge, at Pittsburgh, Pa., which was built 16 years ago, and he found them perfectly preserved by this cement in which they were imbedded. Mr. Roebling is of opinion that the crystallization of fibrous iron by vibrations or by tension, or both combined, "has, in no instance, been satisfactorily proved or demonstrated by experiments;" and