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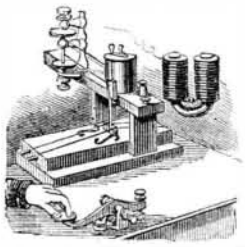
VOL. III., No. 12....[NEW SERIES.]....*Sixteenth Year.*

NEW YORK, SATURDAY, SEPTEMBER 15, 1860.

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 enterprize. 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 hight 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 tuns 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	0.520 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

he insists that "the crystallization in iron or any other metal *can never take place in a cold state.* To form crystals at all, the metal must be highly heated, or nearly in a molten state."

The opinion is quite prevalent among engineers and men devoted to science, that tough metals in a cold condition do become crystalline and very brittle, when subjected a considerable period of time to tension and vibrations. The breaking of the axles of railroad cars, the piston rods of engines, and the iron stringers of bridges, is oftentimes attributed to the metal becoming crystalline. But, while Mr. Roebling is a disbeliever in the crystalline theory of vibrations, he admits that tension and vibrations impair the strength of iron while it retains its fibrous cha acter. This, he considers, is due to a separation of the threads of the pure iron, and the *cinder* with which it is combined, by the vibrations, thus destroying the cohesion of the particles. This is a most interesting question, and the opinion of Mr. Roebling is of great weight in the matter. He asserts that the cables of the Niagara bridge are made of a superior quality of metal; that they possess an abundance of strength; are free from vibration; that they are well-preserved, and may be safely trusted for a long series of years. As iron, in large structures, has been applied only in very recent years, long experience on a large scale has not yet been obtained; but, so far as that experience goes, Mr. Roebling is of opinion that "good iron, not overtaxed by tension and vib ation, and otherwise preserved, will prove one of the most durable building materials at our disposal."

CREOSOTING RAILROAD TIMBER

The facility with which timber can be worked into almost every variety of form, the fibrous and elastic character which it possesses, combined with great strength in proportion to its weight, renders it unrivaled as a material for many purposes. With its many good qualities, however, it has a number of inherent defects, such as combustibility when exposed to high temperatures, and proneness to early decay when exposed to moisture and the atmosphere. In bridges, ships, and other structures, it commences to decay from the very moment it is exposed. When placed in dry situations it endures for quite a long period, but when situated, like railroad timbers, partly above and partly under ground, exposed to air, heat and rain, its life is of very brief duration. The vast expenditures incurred for railroad timber—the sleepers of which have to be renewed every few years—have naturally drawn much attention towards the discovery of some process to render it more enduring. The Kyanizing, Payenizing and Burnettizing processes, for infusing the chlorides of zinc and mercury and the sulphate of copper into the pores of wood, so as to coagulate its sap and render it insoluble, have all been tried with more or less success, but recent experiments in England with creosote seem to give it the palm as a preservative agent over all other substances which have been heretofore used. On the Buckinghamshire Railway about ninety thousand sleepers that had been treated by the above-named three processes, and about thirty thousand prepared with creosote were laid down, and it was found that thelatter were far more durable than the others. Timber which had absorbed about eight pounds of liquid creosote to the cubic foot was apparently as sound at the end of five years as when first treated. It has also been stated that this peculiar substance not only prevents the decay of timber that has been treated when in a sound condition, but it also arrests decay after it has commenced in timber. This is a most valuable condition, and its reliability has been tested on quite a large scale on the Great Northern and the Lancashire and Yorkshire Railroads (England), on which roads creosoted timbers, that have been down for ten years, appear to be as good as when first laid.

This is an important question for our railroad companies; they may have their timbers creosoted on the very spots where the trees are cut down in the forests. Creosote is a product of the distillation of wood in retorts, and it receives its name from its well-known power to preserve animal substances by coagulating the albumen. It is a liquid which may be made from the refuse or useless parts of the very trees that are chosen to make railroad timbers. It can be kept in wooden tanks into which the timbers may be placed and sunk by weights so as to steep them for several days under the liquor. Creosote has a pungent odor, but this is not very objectionable; it is the same as that which flavors smoked ham, and to many persons it is far from being disagreeable. All timbers for bridges, the sills of buildings, and the sleepers of railroad tracks should be treated with this substance or some other equally as good, if there is any. The refuse creosotic compounds of coal oil—those which are obtained from distilled coal as well as from the natural oil wells—may be as powertully antiseptic in their nature as creosote distilled from wood. Experiments should be made to determine this, because such products are now thrown away as waste, whereas they may be usefully applied to render exposed timber ten times more enduring than it now is, and thus save millions of dollars to our country annually.

CONTRACT FOR A STEAM FIRE ENGINE.

We take the following common-sense, practical suggestions from the New York *Times*. There is one very great and unquestionable advantage of free institutions and a free press; they furnish the government with the whole combined knowledge and wisdom of the community:—

To the Editor of the New York Times:

I see by your paper of last Friday that there was no bid for the building of a steam fire engine for Hose Company No. 5. I believe the reasons are, that the advertisement was not conspicuous, being mixed up with street contracts; that the time was too short, and that, so far as one builder is concerned, the specification of a cylinder not less than 6¾ inches bore by 8½ inches stroke, deterred him from bidding, his engine being rotary. I know one establishment that was disposed to bid for the contract, but had only five days notice, which was not sufficient to make an estimate, unless the design had been already made. A month would be but a moderate time for a shop not already in the business, to propose a plan and estimate upon it; and I respectfully suggest that the authorities should allow this time, and more, if they can spare more.

I further suggest that the printed forms should be sent to all the fire engine builders and to the principal machinists, and that the proposal should be advertised and also noticed in the SCIENTIFIC AMERICAN, and other papers that go to machine shops. I do not believe that two out of twelve or more shops that build steam fire engines knew that this matter was open to them, or could have been able to make their bids in time. The reference to a particular New York engine, as to size and style, would make it necessary to see that engine in order to estimate properly.

I would further suggest that the specification should be revised, the work to be done fully stated, and no reference should be made to the engines now in use, to render a journey to New York necessary as a condition of being able to make an intelligent estimate.

Yours, respectfully,

AN ENGINEER.

THE FAIRS OF 1860.

We take the following full list of the agricultural and mechanics' fairs of this Fall from *The Country Gentleman*, omitting those which have already been held:

NATIONAL.

American Institute	New York, opens Sept. 27.

STATE.

Alabama	Montgomery, Oct. 29, Nov. 2.
Canada, Upper	Hamilton, Sept. —
Connecticut	No exhibition on account of cattle disease.
Georgia	Atlanta, Oct. 23, 26
Georgia, Planter's	Macon, Dec. 3, 59
Georgia, Lower	Savannah, Nov. 22
Indiana	Indianapolis, Oct. 15, 20
Iowa	Iowa City, Oct. 2, 5
Kentucky	Bowling Green, Sept. 18, 22
Kentucky, North Eastern	Ashland, Sept. 18, 20
Maine	Portland, Sept. 25, 28
Maryland	Baltimore, Oct. 30, Nov. 3
Michigan	Detroit, Oct. 2, 5
Minnesota	Fort Snelling, Sept. 27, 29
Mississippi	Holly Springs, Oct. 16, 20
Nebraska	Omaha, Sept. 19, 21
New Hampshire	Manchester, Oct. 3, 6
New York	Elmira, Oct. 2, 5
North Carolina	Raleigh, Oct. 16, 19
Ohio	Dayton, Sept. 25, 28
Oregon	Oct. 2
Pennsylvania	Wilkesbarre, Sept. 24, 27
St. Louis Ag. and Mech. Association	St. Louis, Sept. 24, 30
South Carolina	Columbia, Nov. 13, 19
Tennessee, Mid. Div.	Franklin, Sept. 24, 28
Virginia	Richmond, Oct. 22, 28
Wisconsin	Madison, Sept. 24, 29

HERMETICAL MASTIC OF GRAPHITE.—The preparation of this cement is very simple. A mixture is made of 6 pounds of plumbago, 3 pounds of fine chalk, 8 pounds of the sulphate of baryta, and 3 pounds of linseed oil, well boiled. The black lead, chalk and baryta must be reduced to a very fine powder, and well-mixed with the oil. A cement is thus obtained which, as shown by experiments, is much superior to that made with red lead, and which may be employed with great advantage in luting the joints of steam boilers, water pipes, gas pipes, &c.—*Journal de L'Eclairage au Gaz.*

APPLICATION FOR THE EXTENSION OF A PATENT.

Improvement in Drawing Frames.—Eliza Pray, administratrix of Joseph Pray, deceased, and Christopher Stafford, of Plainfield, Conn., has applied for the extension of a patent granted to the said Joseph Pray and C. Stafford on the 12th of November, 1846, for an improvement in the above-named class of inventions. The testimony will close on the 20th of October next; and the petition will be heard at the Patent Office on the 12th of November, 1860.

DR. BRADLEY'S IMPROVEMENTS IN TELEGRAPHING.—On page 274 of Vol. I. (new series), SCIENTIFIC AMERICAN, we noticed an improvement in telegraphing, invented by Dr. L. Bradley, now of this city, by which from 10,000 to 15,000 words per hour could be transmitted, in place of 1,500 or 2,000, which had been the previous limit. On applying this apparatus to long circuits, however, Dr. B. found a limit to the rapidity in the action of the relay magnet, and he has since been engaged in improving this part of telegraphic apparatus. He has now a relay which will enable him to transmit 10,000 words per hour. He has also connected this relay with an improved sounding apparatus which enables him to dispense with the local circuits for those who read by sounds. A full illustration of this great invention will appear in our next issue.

MACHINE SHOP ARCHITECTURE.—The illustrated article, published in another part of this paper, on Iron Works—their arrangement, location and construction, will be found worthy of the attention of such of our readers as take an interest in the subject. It is written with intelligence and ability, and will commend itself to a large class of our readers, as the subject is an important one, and has never before been presented in any journal so far as we know. The article, with accompanying plans, will be completed in our next number.

MCCORMICK AND THE PRESS.—In our issue of the 25th ult., we noticed the peculiar manner in which the famous inventor of the reaper, Mr. McCormick, became connected with the newspaper press of Chicago. It seems acording to the *Times* and *Herald* of that city, that Mr. McCormick did not get the control of the *Times* by the summary process of enforcing certain claims which he is alleged to have purchased against it. The transaction, as it is detailed, shows, that he acted all the while like a straight-forward man.

RECENT AMERICAN INVENTIONS

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

MAGNETO-ELECTRIC MACHINES.

These improvements are for the most part applicable to either of the two common forms of magneto-electric machines heretofore constructed, namely, that which consists of one or more series of helices composed of covered copper wire coiled round cores of soft iron, applied to rotate between or near the poles of a series of stationary permanent magnets, and that which is composed of one or more series of permanent magnets, applied to rotate near one or more series of stationary helices, but all the improvements are applicable to machines of the first-mentioned form. The first improvement consists in the employment of a number of helices in each wheel or circular series proportioned to the number of magnetic poles in each circular series of magnets as three to two, for the purpose of making the attractive force of the magnets always counterbalance the retarding or holding back force. A second improvement consists in the arrangement of the helices of two or more wheels or circular series in a spiral relation to each other, that is to say, so that in a machine having two wheels or circular series of helices each helix of either wheel or circular series is in a line midway between the lines of the two helices of the other wheel, and that in a machine, having more than two wheels or series of helices, the helices of the several wheels are arranged in regular succession at a distance in advance of each other equal to the distance between those of each wheel or series divided by the number of wheels or series in the machine, the object of such arrangement being to bring the helices of the several series alternat-