THE FIRST TYPE WRITING MACHINE.

(*Continued from first page.*)

or dictation is done almost as fast as one can speak; and thirty duplicates may be simultaneously printed. Besides the mechanism just named, there are on the market the Caligraph and other most excellent machines, working on the same principle. Moreover, there are various forms of type writers, acting on different principles and doing good work, though perhaps lacking in speed or means for duplication.

The first example of a type writer was a model machine made by Mr. Beach in 1847. It printed upon a sheet of paper, supported on a roller, carried in a sliding frame, worked by ratchet and pawl, had a weight for running the frame, letter and line spacing keys, paper feeding device, line signal bell, and carbon tissue. It had a series of finger keys, connected with printing levers, which were arranged on a circle, and struck at a common point on the roller. This machine worked very well, but the quality of its printing did not satisfy the inventor's critical eye. So he laid it aside for improvement at a future time. Meanwhile, he constructed another form of the invention, namely, a type writer to print in raised letters, without ink. This is the machine illustrated in our engravings. It was first publicly exhibited in operation at the Crystal Palace Exhibition of the American Institute, in the fall of 1856, where it attracted great attention and took the highest prize—the gold medal—as one of the most novel exhibits of the occasion.

Referring to our engraving, it will be seen the embossed letters are printed on a strip of paper, which runs centrally through the machine.

The printing levers are arranged in a circle, in pairs, one riding on the other. When the operator, Fig. 1, presses a letter key on the keyboard, a pair of printing levers, answering to the letter key, are brought together, the paper being between them. The printing types are at the extremities of the levers, one lever having a raised letter and its mate a sunken or intaglio letter. The construction and action of the machine will be readily understood by an examination of the engraving. The paper is drawn from a reel (seen in Fig. 1) by a ratchet wheel that feeds the paper on each up-stroke of the printing levers.

Any desired change in the spacing of the letters is effected by turning the pin seen at the right, Fig. 2. Fig. 1 shows the machine as it appears in operation; Fig. 2 a central sectional elevation of the mechanism removed from its case. On the roll of paper above is shown the style of letter produced. Fig. 3 is a perspective of the machine removed from its case. This machine does elegant work, operates with great rapidity, and the alignment of the lettering is almost perfect. It is made in brass, and presents an ornamental appearance.

The patent for this invention was granted June 24, 1856, expired and became public property in 1870. The patent drawings show both the single and double printing keys, for doing either ordinary ink or rubber printing or embossed letters; also the carbon ribbon, device for moving the same, a paper feeding device, with which all the keys are connected in common, whereby the paper is moved whenever any key is pressed.

Speaking of the progress of the type writer industry in general, Mr. J. B. Huling, in an able contribution to the *Inland Printer*, makes the following observations:

The facilities of all who can make any machines whatever are pushed to the utmost, and even then the foreign field cannot be canvassed for orders, for the entire output seems to be required for the trade of our own country. It is estimated that 50,000 machines of all kinds have so far been manufactured, and that about 75 per cent of that number are in current use, the rest having been worn out or otherwise destroyed. The capacity of factories now employed in building type writers is from 10,000 to 15,000 machines per annum. Where the type writer has once been found really requisite, it will never be dispensed with.

Type writers have been of particular benefit to professional men, such as clergymen, lawyers, editors, and litterateurs, who usually are the most persistent pen users; but in facilitating commercial correspondence they find their greatest usefulness, and thence arises the demand, now so great that it cannot be met fast enough. Business men, in particular, have special reasons to wish for clearness in their papers, as monetary loss may often be caused by slight obscurities.

No large business house may be found in these days without a type writer of some kind. To lawyers they have been of most marked aid, mainly through the ability to produce manifold copies at a single impression.

Most conspicuously, the existence of type writers has contributed to encourage the study of short hand, so that opportunities for instruction in that difficult art were never so numerous before. There are ten teachers for one formerly, and no institution educating in commercial matters is without one, while they find employment in many public schools. Note taking clerks are demanded in every branch of trade, and their services have been most potent in swelling the bulk of general correspondence and increasing the volume of professional papers.

In all the larger cities a great many persons are employed as copyists in type writing altogether, usually in connection with shorthanders, who solicit all kinds of dictation jobs in the courts and offices, and even going to small business houses by the hour, where a permanent clerk could not be maintained. To become most proficient in this kind of work requires intelligence and practice.

Manifolding, or producing duplicate copies at once, in all type writers depends on the ability to impress with force from hard faced type. A book of alternate white and colored leaves is made, and put in the type writer as a single sheet. Black is the ordinary color used. A paste, principally of pure carbon or lamp-black and tallow, is smeared on one side of a tough tissue paper, and hence arises the common designation of all transferring sheets as carbon paper. The colored side is put against the leaf to be printed on. The first or outside leaf is printed through the ribbon, and the inner white leaves receive a set-off from a colored one with each impression. Very thin or soft paper makes the best copies, and from three to six is the ordinary production. For special purposes thin oiled paper is employed altogether for duplicates, with double carbon sheets, setting off on both sides, the work being readable through the oiled sheets. The ribbon is removable, to save its interference with the sharpest impressions. From twenty to thirty good copies have been thus secured.

A Woman Engineer.

Miss Mary S. Brennan is matron of the Mount Auburn Young Ladies' Institute, Cincinnati, O. She is a college graduate, a well read and highly cultured young lady, of retiring disposition, but full of that American ambition which characterizes its leading women.

As matron of the institute, the duties of heating the building devolved upon her: and, owing to some difficulty, she resolved to have the machinery overhauled. She had made practical mechanics one of her favorite studies, and was well versed in the construction of boilers and machinery. She drew new plans for a furnace, and took the boiler from under the building and placed it under one of the porches. She personally supervised the removal and construction of the furnace, and then asked for permission to take full charge, which was given; and she went before the board of inspectors, and was examined, and granted a first-class license as steam engineer.

Miss Brennan has taken full charge of the engine. She has a fireman who is under her orders, and all the machinery is daily inspected by her, and all repairs are made according to her plans and directions.

The board of inspectors speak very highly of Miss Brennan's examination, and say a better qualified applicant was never before them. The license, the first granted to a woman, was issued October 16, 1886, and reads as follows:

STATIONARY ENGINEER'S LICENSE.

ISSUE NO. 837.

By authority of the city of Cincinnati, the undersigned, Inspectors of Stationary Engineers for the city of Cincinnati, certify that Miss Mary Brennan, having been duly examined touching her qualifications as an engineer of stationary steam engines, is a suitable and safe person to take charge of and operate stationary engines, boilers, or steam generating apparatus, for the city aforesaid, and do license her to act as such for one year from this date, unless the license be sooner revoked or suspended.

The above named is hereby licensed to perform the duties of engineer at the Young Ladies' Institute, Mount Auburn. Given under our hands and seal this 16th day of October, 1886.

E. D. BATEMAN, J. W. ROSS, *Inspectors.*

Successful Descent of the Amazon River.

Dr. H. H. Rushby, the eminent botanist, for nearly two years past has been exploring the resources of Peru, Bolivia, and Chili, with respect to the supply and cultivation of cocoa leaves. His travels have been made on behalf of Parke, Davis & Co., of New York and Detroit, the prominent manufacturers of the new alkaloid known as cocaine. After finishing his cocoa researches, the doctor was authorized by Messrs. P., D. & Co. to return by way of the Amazon River, with a view to obtaining scientific information concerning the flora and other features of the region. Dr. Rushby's mission has just been brought to a close by a successful descent of the great river. From the mountains of Bolivia, he floated in a canoe a distance of some 3,500 miles, reaching Para, in Brazil, a few days ago. This must have been a remarkable journey, full of perils and adventures. We await with much interest the particulars of Dr. Rushby's experience and the scientific results of his travels.

FLAT turnips constitute one of the best crops to raise in a garden after an early crop has been secured. A use can be found for them in the house as well as the barn.

Correspondence.

Combustion of Powder Outside of the Gun.

To the Editor of the Scientific American:

"Expulsion of Unburned Gunpowder from Cannons." Admitting the correctness of your remarks concerning the wear sustained by guns from the friction of unburned powder, I think it advisable to point out that the outer projections in your engraving are not only due to the combustion of powder outside the muzzle, but also to pieces of ignited semi-carbonized asbestos cloth or other material used to wrap the charge. Indeed, I question that the most progressive gunpowder would travel eight times the length of the gun (as per engraving) before complete combustion.

CHARLES A. SERRE, F.C.S.

Brooklyn, December 4, 1886.

Effect of the Earthquake on the South Carolina Railroad.

To the Editor of the Scientific American:

Your quotation and illustration from the *Railroad Gazette*, on the effects of the earthquake on the South Carolina Railroad, is interesting. There is, however, in my opinion, a very erroneous theory expressed as to the cause of the bending of the rails in reverse curves by the *oscillation* of *east and west forces.*

The true cause, as I believe, is the contraction of the earth crust in settling, to suit inner shrinkage, by reason of radiation and consequent cooling, thus shortening distances and bringing such end thrust on the rails that they are compelled to bend.

If lateral oscillations were to bend the rails, they would also bend the roadbed and the sides of the ditches, which, I understand, was not the case.

The sliding of the cross ties to one side of the roadbed shows that the rails moved the ties, and that the cross ties did not move the rails. Everything goes to show that the end thrust on the rails produced the bends.

Some, at first, contended that the rails were elongated by the wave motion—a far-fetched idea; for all agree that the earth does contract, and end thrust is, therefore, a natural consequence.

Perhaps, too, the space left between the rails may, in some places, be closed too much for next summer's expansion. Railroad men had better examine.

H. E. EADDY.

Johnsonville, S. C., November 26, 1886.

Curious Phenomenon in Venezuela.

To the Editor of the Scientific American:

The following brief account of a recent strange meteorological occurrence may be of interest to your readers as an addition to the list of electrical eccentricities:

During the night of the 24th of October last, which was rainy and tempestuous, a family of nine persons, sleeping in a hut a few leagues from Maracaibo, were awakened by a loud humming noise and a vivid, dazzling light, which brilliantly illuminated the interior of the house.

The occupants, completely terror stricken, and believing, as they relate, that the end of the world had come, threw themselves on their knees and commenced to pray, but their devotions were almost immediately interrupted by violent vomitings, and extensive swellings commenced to appear in the upper part of their bodies, his being particularly noticeable about the face and lips.

It is to be noted that the brilliant light was not accompanied by a sensation of heat, although there was a smoky appearance and a peculiar smell.

The next morning the swellings had subsided, leaving upon the face and body large black blotches. No special pain was felt until the ninth day, when the skin peeled off, and these blotches were transformed into virulent raw sores.

The hair of the head fell off upon the side which happened to be underneath when the phenomenon occurred, the same side of the body being, in all nine cases, the more seriously injured.

The remarkable part of the occurrence is that the house was uninjured, all doors and windows being closed at the time.

No trace of lightning could afterward be observed in any part of the building, and all the sufferers unite in saying that there was no detonation, but only the loud humming already mentioned.

Another curious attendant circumstance is that the trees around the house showed no signs of injury until the ninth day, when they suddenly withered, almost simultaneously with the development of the sores upon the bodies of the occupants of the house.

This is perhaps a mere coincidence, but it is remarkable that the same susceptibility to electrical effects, with the same lapse of time, should be observed in both animal and vegetable organisms.

I have visited the sufferers, who are now in one of the hospitals of this city; and although their appearance is truly horrible, yet it is hoped that in no case will the injuries prove fatal. WARNER COWGILL.

U. S. Consulate, Maracaibo, Venezuela,
November 17, 1886.