

THE GREAT EXPOSITION—LETTER FROM UNITED STATES COMMISSIONER PROFESSOR R. H. THURSTON.

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VIENNA WELT-AUSSTELLUNG, JUNE, 1873.

We have already reached Vienna, coming through from Glasgow by express trains, only stopping at London a few hours to complete our arrangements for continental travel, and spending one day in Paris and a part of a day in Munich, *en route*. We found the London hotels crowded with strangers and were compelled to take private lodgings, paying eight shillings for two rooms—a most exorbitant price for London. The races and other attractions of the season produce, for a few weeks in each year, this immense influx of visitors. Calling on a few friends and making a few purchases, we stored such portions of our *impedimenta* as were only necessary for the transatlantic voyage; and, in less than ten hours after our arrival in the great metropolis, we were on the rail again, and rapidly traveling toward Dover. We had a beautiful night and a smooth sea, and crossed to Calais in unusually short time. We were but about an hour and a half in making the passage from wharf to wharf. Under even these exceptionally favorable circumstances, however, the experience was by no means a pleasing one. The steamer was moderately fast, but had no other recommendation. Small, dirty, and crowded, without comfortable accommodation below decks for even the small number that the craft was capable of carrying, uneasy in the best of weather and in every way unfitted for such employment, these steamers are most discreditable to all concerned in their employment and management. We spent the greater part of the time, while crossing, on the forward deck; but, even with so smooth a sea, the spray was continually flying over us and besprinkling the tarpaulins covering the baggage, which was there piled in a huge mass without other protection. We were finally driven aft among the discontented passengers, who clustered in those spots which were most protected from wind and spray. Such shameful lack of accommodation, on an important line of travel, would certainly not be as long tolerated in the United States as it has been in the Dover and Calais route. There seems to be no certainty, even yet, that any of the well planned arrangements, proposed by Mr. Fowler and by other well known engineers, will be soon adopted. English capitalists seem to shrink from the expenditure of the large amount of money required for the prosecution of such schemes, even when proposed by competent engineers; although the proposition to construct a tunnel beneath the straits, and the even more chimerical plan (of Boute) of bridging the channel, have met with some pecuniary encouragement.

PARIS

seems as gay and its people as vivacious as ever; and, except the sadly marred public buildings near the Tuileries and the ruins of the Louvre, there is little to remind the stranger that an empire has so recently been overthrown, and that this great country has seen its enemies passing in triumph through its capital, leaving it in the hands of even less scrupulous domestic foes. Still less does it seem possible that the party in power and the government which it sustains are resting upon a most uncertain foundation, and that another revolution may, at almost any moment, bring about another succession of terrible events.

The five months of siege and the seventy-three days of the reign of the *commune* have left their mark; but these battle scars are now rarely observed, and the greater part of them will soon be effaced. The loss of the library and collections of the Louvre, that of the splendid collection of tapestries, dating from the time of Louis XIV., of the civil records and of some few other treasures, cannot be repaired. On the whole, the city has suffered far less than might have been anticipated, and what Théophile Gautier calls "her invincible life" has already become as characteristically active and seemingly happy as ever. A few sad faces and a few quiet groups in the *cafés* are the only evidences, beside the ruins, which can be detected, of the terrible trials to which these people have been subjected.

A glance at a few of the public buildings and monuments, a drive along the banks of the Seine to view its beautiful bridges, a ramble in the *Jardin des Plantes*, which gave an opportunity to see something of the wonderful zoological collection, and a walk through the beautiful *Champs Elysées*, furnished pleasing employment for the greater part of a day; but we still found time to call at the

ECOLE CENTRALE DES ARTS ET MANUFACTURES,

to inspect the buildings, to learn something of the methods adopted in instruction, and to see the actual operation of the system in the class rooms and work rooms. The building is old, the class rooms rather dark and badly arranged, and the apparatus by no means what we had anticipated. The system of instruction is excellent. Our little party were unanimously of the opinion that young Americans need not desert their own country to enter here. We will endeavor to visit the *Conseratoire* on our return, and hope to see much more there of the French system of practical instruction.

Early next morning, we were off for Munich, and were all day riding through the heart of France—a beautiful and fertile country. The necessity of planting trees is better recognized here than at home; and, in all directions, as the train moved rapidly through the pleasant country bordering on the Marne and across to Strasbourg, long lines of flourishing trees indicated the position of the wagon roads or the boundaries of the fields. At Meaux-sur-Marne is a fine cathedral, several centuries old, where that noble French divine, Bossuet, officiated, and where he composed his still well known works.

Just beyond Meaux, we noticed a large and neatly designed frame house, forming almost as remarkable a contrast with the general architecture of the neighborhood as the old cathedral would be if seen in the heart of one of our western wooden cities.

From Epernay and Chalons-sur-Marne, the road passes through the champagne district, where is produced all of the real champagne, although, it is said, far less than is drunk as champagne in the United States. The total production is stated at rather less than 15,000,000 bottles; and, of these, between 3,000,000 and 4,000,000 are sent to the United States. The country beyond Chalons becomes somewhat monotonous. The character of this road, and of its rolling *sack*, are more in consonance with American practice than the British. The road bed is good, but inferior to the English, and the carriages are, on the other hand, quite superior, being well supported, finely upholstered, roomy and comfortable. The speed, including stops, is not equal to either that of British or American trains. Between Paris and Strasbourg, it averages twenty-five miles an hour. The locomotives are powerful and very well built, but have, to an American eye, a rough and ugly appearance. Their working parts are very well made, however, and their performance is claimed to be satisfactory.

STRASBOURG

was reached in the evening; and thence to Munich, the night ride gave no opportunity of seeing the country or its people, until our stopping at Ulm, after sunrise, awakened us, and we were able to see its fine old cathedral, to obtain a glance at its fortifications, and to take our first look at the Danube, as we crossed to the new town. The old battle ground of Elchingen, where Ney gained such important advantage over the Austrians in 1805, is very near, and comes in sight as the town is left behind.

MUNICH

was reached in time for breakfast. It is an exceedingly pleasant and interesting city, and its noble buildings and splendid historical and art collections make it one of the most attractive of European towns. The finest bronze castings made in Europe are produced here, and Munich bronzes are the standard toward which Connecticut has so well approximated in producing the beautiful bronze doors of the Capitol at Washington. We stopped at Munich until late in the evening, and found time to see the more interesting portions of the city, and to visit a few of the more important of its institutions.

We were gratified by finding, in the public square, before the National Museum, and face to face with the statues of two Bavarian military heroes, statues of the great physicist Frauenhofer and of our own countryman Benjamin Thompson, who, having less commendable views in politics than in science, was compelled, during the revolutionary war, to leave his native New England village, and who, emigrating to France, attained distinction and became Count Rumford. His extraordinary talent was well exhibited by the crucial experiment by which he proved the falsity of the old molecular theory of heat. The fact that science belongs to the world, and not to any province, is pleasingly exhibited by the erection of this statue here.

The museum contains an extensive and extremely interesting collection of industrial products, and of the military accoutrements of all ages. The collection of clocks is wonderful for its extent and variety. Two of the most remarkable are encased in gold and silver and mounted on stands of most elaborate workmanship. They were constructed by the clockmaker Scheiner and Eichler the goldsmith of Augsburg, two hundred years ago. In several of the large chambers are specimens of those graceful and elaborate forgings which gained for the smith of two or three centuries ago high honors, and sometimes knighthood. Locks and keys, chests, images of animals, saws and various other tools, elegant tracery, doors and gates, and many wonderfully intricate shapes, which may be seen here, would puzzle the modern blacksmith in their reproduction. A screw vice, two hundred and fifty years old, precisely similar in general form to those which are still seen in all of our older workshops, but elegantly adorned with forged tracery, was a very interesting object. Those ancient smiths were wonderfully skillful workmen.

Among the arms, are a *mitrailleuse* model, and a breech-loading rifle, very old, but without date, and of a very creditable design. The former was made for Gustav Adolf, if the attached legend is correct.

A visit to the *Polytechnicum*, the polytechnic school of Munich, will always be remembered as one of the pleasantest events of our trip. This splendid institution is supported by the State. The building is more than 1,200 feet long, of stone, in the later renaissance style, and beautifully adorned. The collections in all departments are excellent, and, in that of mechanics and engineering, very extensive. The space available in this great edifice is already found too limited for twelve hundred students, and the plans are nearly completed for additional buildings, although this one is not yet finished.

From Munich, a continuous ride of twelve hours brings us to

VIENNA,

and the pleasing information that the United States section is rapidly assuming a creditable appearance encourages the belief that something interesting relating to it, as well as to the *Welt-Ausstellung* as a whole, may be found for the next letter. Our exhibitors are receiving compliments, we are told, from all quarters for the excellent character and the value of the articles which make up our modest contribution.

R. H. T.

The Hotchkiss Revolver Cannon.

The following is a translation, from the *Revue d'Artillerie* of June, 1873, of a report of the trial of the Hotchkiss revolver cannon at Satory, near Versailles, France:

Trials were recently made at the Polygon at Satory with a revolving cannon invented by Mr. Hotchkiss, and destined for the Italian Government. These experiments were for the purpose of testing the mechanical value of this engine. The new cannon has a caliber of 1.57 inches, and is essentially different from all other *mitrailleuses* presented up to this time, especially in firing a small cast iron shell with a percussion fuze, the effect of which must be terrible at long ranges.

A complete description of this cannon will be given later. At this time, I shall only give some details concerning the ammunition used. This ammunition is an explosive projectile attached to an iron cartridge. The cartridge case is made from a tinned iron tube, soldered, with one end turned down to form a cup. This cup or tube is reinforced in the interior by two iron cups, and fixed with three rivets on a large washer of sheet iron, which forms the head and is designed to withstand the pressures of the gases, and to give a hold to the extractor. The priming is fixed in the center of this head.

The cartridge shell will hold 3.5 ounces of powder. A thick felt wad is put between the powder and the projectile. In the cartridges fired at Satory, the powder charge was reduced to 2.8 ounces Austrian powder, and the room left was filled up with two washers of ordinary paper, placed on the powder and covered by a little cotton.

The projectile has a length of two and one half calibers, and a portion of its length is covered with brass, having cuts designed to be forced into the rifling. Its weight is 17.6 ounces, and it holds 1.4 ounces of powder. The cartridge, loaded complete and primed, has a weight of 28.2 ounces.

The projectile does not seem to be fastened tight enough in the cartridge case, as it can be taken out with a little effort with the hand, and it is feared that, in transportation of them in boxes, the projectiles might separate from the cartridge shells.

To avoid all chances of accidents, the cannon revolver was placed in battery about 325 feet from the butt, the projectiles being loaded and having their percussion fuses. Forty shots were fired. At the commencement of the trial, the fired cartridge shells did not drop out of the extractor regularly. This slight defect was remedied on the spot in a few minutes. After this, no difficulties or irregularities in the firing occurred. The cartridges were oiled previous to firing. The cartridge shells did not show any damage by firing, and can be reloaded and fired several times. One was found unsoldered, but was not broken, and acted perfectly as a gas check, and it could, like the others, be used again by being resoldered, which can be done without difficulty.

Only one misfire occurred, and the same cartridge was fired on the third trial after missing twice. There was also only one misfire with fuses. Generally, the projectiles passed through the board target and exploded on striking the ground. Only one projectile was exploded by striking the board of the target. One projectile broke in the barrel of the cannon; but this accident should not be attributed to the irregular working of the fuses, because the projectiles proved to have been badly cast and one sided, and left very weak by the hole being badly one sided.

Six shots were successfully fired in twelve seconds, by loading the cartridges one at a time. Then fifteen shots were fired in fifteen seconds in loading with cases in which a certain number of cartridges had been placed previously. The firing could be kept up for a certain length of time at the rate of sixty shots per minute, which gives thirty kilos (or about 70 pounds English) of cast iron fired in this time. The firing is very regular, and the sighting did not seem to vary to any noticeable extent.

The projectiles exploded into 12 to 15 pieces, large enough to kill at a certain distance from the exploding point. The butt piece does not generally break, although breaking lines have been prepared on it.

One inconvenience was the rapid brassing of the barrels which took place during the trial. It appeared at the first shots, and increased rapidly. Without any doubt, it is to be attributed to the bad quality of the brass from which the covering of the projectiles has been made.

Generally, the mechanism of the Hotchkiss revolving cannon seems to work surely and regularly, and the ammunition will do good service if the projectiles are more firmly attached to the carriage. The projectiles are difficult and delicate to make, and must necessarily be expensive. This cannon will, without any doubt, produce terrible effects at distances approaching those of field artillery, and the explosive quality of its projectiles assure to it a superiority over all other *mitrailleuses*, as its fire can be rectified by observing the explosions of falling projectiles.

A. JOUART,
Capitaine d'Artillerie.

PERILS OF BALLOONING.—Frank K. King is reported to have made a balloon ascension from Morristown, Vermont, on the 4th of July. When he had risen to the height of nearly three miles he encountered a snow storm, which so loaded the top of the balloon that it was driven down, and he landed in a deep forest some eight miles distant. It took a searching party, of 500 strong, forty-eight hours to find him. He was discovered in a famishing and exhausted condition, but had sustained no other injury.

Of the eight Corliss engines in the Vienna exhibition, two come from Switzerland, one from Belgium, two from Germany, and three from Austria.