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Leaving Vienna late in the evening by express train, the traveller may reach Dresden next morning. The route traverses a pleasant country, but no objects of remarkable interest are seen until, not far from the end of the journey, the little town of Bodenbach is reached. Here our baggage is examined by the customs' officials with equal courtesy and care; we get our breakfast and move on. Here we enter the

SAXON SWITZERLAND,

and as we rapidly ride along the banks of the Elbe, we admire the beautiful mountain scenery on either hand, with high rugged cliffs, bordering the river or confining the narrow lateral valleys with their tangled linings of green foliage, the dark ravines and picturesque basaltic peaks and jutting promontories, the remarkable natural bridge at the Bastei, and the lofty heights of these immense rocks, the *Lilienstein* and the *Königsstein*. The latter is crowned with the once impregnable fortress which defied, in earlier times, the attempt of the "Conqueror of Europe" to breach its walls from the heights of *Lilienstein*. The strange forms assumed by the basalt produce quaint and striking views all along the whole distance; from the crossing of the Elbe at Bodenbach nearly to Dresden, these views form an uninterrupted succession of most beautiful panoramas. The river itself presents objects alike novel and interesting. Here and there, anchored in the stream, are queer *schiffmühle*, large scows or rafts carrying mills for grinding grain, and deriving power from the action of large paddle wheels which are turned by the rapid current. Towage is performed by a steamer which is destitute of paddle wheels, screw propeller or oars. It is a *Kette-dämpfer* or chain steamer, which propels itself and draws after it a heavy "tow" by overhauling a strong iron chain which is laid along the bed of the river, and which, coming on board at the bow, passes around a drum amidships and overboard again at stern. So far as expenditure of power is concerned, this is the most economical of methods of propulsion, and the apparent ease with which these vessels are steered and maneuvered is quite surprising. It is somewhat remarkable that this method, which has been long known and practiced in this country, and of which the economy is well understood by all engineers, has been so little used in America, where we have so many locations to which it would be most suitable. The objections to its use in other places would probably be found to be the expense of the chain on long routes, and the fact that the craft is confined to a precise line of travel from which it cannot depart to meet the exigencies of wind or tide, or to avoid other vessels. By this system loss from "slip," which amounts, in ordinary propulsion and towage, to from ten to fifty per cent of the total power expended, is entirely avoided.

Plying on the river are also many little passenger steamers, conveying excursionists to and from the many beautiful watering places and romantic little villages which are scattered along either bank. "Beautiful little boats," the guide books call them, but they look far more quaint and antiquated than beautiful to the traveler who has traversed Long Island Sound, or who has sailed upon the Hudson or upon the Mississippi.

Leaving the river bank, we approach Dresden, crossing a level fertile plain, and are soon landed in this Saxon capital. Dresden has always been a favorite residence both with Americans and with English people, who find here cheap living, good music, a noble gallery of paintings, and good schools for their children. The beautiful suburbs of the town afford pleasant excursions and beautiful drives in summer; and in winter, music, the theater, and skating make the time pass very pleasantly.

At the earliest possible moment we visited the

POLYTECHNIC SCHOOL,

which is one of the oldest and best in Europe, although not very well provided with models and illustrative apparatus in its technical departments. Some of the work done by the students is remarkably fine. One had planned and made the drawings of waterworks for supplying a large town, another had completed the specifications and designs of a peculiar form of steam engine, a third had planned a cotton mill, and a fourth had prepared designs for an ironworks. The amount of time given to the work in the drawing room, is, however, exceptionally great. The student is usually engaged in this work sixteen hours per week, beside which he attends to studies and the lectures given in the several collegiate departments. In some instances, the designs produced by the students exhibited considerable inventive talent; and, in the majority of instances, the plans were well chosen and the details were well proportioned. The young men who, having had the advantages of such instruction, have sufficient energy and love of their profession to enter the workshop, and there learn the no less important details of shop practice, cannot fail to succeed in life, even in Germany, where good opportunities are so much more infrequent than with us.

We found time to visit the

GREAT PICTURE GALLERY

for which Dresden is noted, and there saw the noble works of Correggio and of Rubens, of Rembrandt and Titian, and of dozens of other famous painters of early and of later times, and finally stood, in silent, wondering admiration, before the noblest of them all, Raffaele's *Madonna di San Sisto*. We passed hastily through the *Griene Gewerbe* (the

green vaults), examining curiously and hurriedly the wealth of art treasures preserved there.

We wandered through the pleasant streets, enjoyed a ride through the lovely *Grosse Garten* and, still more, our visit to the great library, where, among its 800,000 volumes, we found many referring to the early history of our own country. We should have been glad to have spent much more time here, but duty forbade, and we hastened on to Berlin, after taking a day to visit the famous old town and the celebrated

MINING SCHOOL OF FREIBERG,

the *Berg-Academie*. Here we found a good collection of models of mining apparatus and machinery, and a considerable number of newly made duplicates, which, we were pleased to learn, were made for some of our own schools in the United States.

Freiberg is situated in the midst of a mining country, and the exceptional advantages which the school is enabled to offer to students, in consequence of this fact, together with the high character of its professors, have given it a celebrity second probably to none other in the world. A large number of young men from the United States have been educated here. To-day, fortunately, there is no necessity for the American student of mining to leave our country to secure his professional education. The town appears to the stranger curiously antiquated, and the people sometimes almost equally so. The picturesque costume of some of the women, consisting of a red hat and a blue gown, or of a blue head covering and apron with a red petticoat, by its strong contrast of colors, is quite striking and pleasing.

The great city of Berlin has many attractions for the tourist, although it bears no comparison with either London or Paris. Its noble buildings and fine wide streets, its palaces and gardens, and its museums, are exceptionally interesting and pleasing. To us, as to the ordinary visitor, they presented unusual attractions, and the limited time that was allowed for their inspection was enjoyed greatly. But even more interesting than the palaces was the great

LOCOMOTIVE WORKS OF BORSIG,

and the two technical schools—the *Bau-Academie* and the *Gewerbe-Schule*—were not less interesting than the museums.

Borsig's works are among the most important in Germany, as may be seen from the fact that of the 5,455 locomotives reported as belonging to the German railroads in 1870, more than 1,900 were built at this establishment. Only the locomotive works are in Berlin. The iron and steel is made at the large ironworks near the mines, and the boiler shops and forges are at Moabit, a little way from Berlin.

In 1870 the *Borsigsche Anstalt*, in the city, made 158 locomotives. Its capacity is now 170 per year. The *Gesellschaft für Fabrication von Eisenbahnbedarf* in the same year turned out 2,322 railroad cars, valued at three and a half millions of thalers. The ironworks at Moabit in that year worked up 107,609 centners of iron. The locomotive works now employ from 1,500 to 1,800 men, who work eleven hours per day and receive from ten to fourteen thalers—5 to 7 dollars—per week in wages. A restaurant and dining hall have been erected on the premises, and a large number of the workmen avail themselves of the privilege thus offered of taking their meals at the works. The buildings and tools are generally old; but additional buildings are in course of erection, and modern tools are to be placed in them. Ample light, and that usually from above, and good ventilation, the points in which old establishments are invariably defective, are well looked to here; and those most invaluable of all tools in shops doing heavy work, traveling cranes, are not forgotten and are well placed.

A few new tools were already in, and among them was a fine tool, imported from England, for the especial work of trimming up engine frames, which here, as in all European locomotive works, are cut from rolled plates. The machine has four tool posts, feeds in every direction, and the position of the cutting tool may be altered to suit the work. The locomotive frames are cut from plates thirty millimeters—one and two tenths inches—in thickness. Tender frames are of lighter plate, ten millimeters thick. Fire boxes are invariably of copper, and the tubes are of copper at and near the firebox end, the main portion being of iron. Some of the tubes are English, and some are from Düsseldorf.

FORGED WHEELS.

Here, as all over Europe, all wheels are forged. A cast iron wheel, whether for cars or for locomotives, would be looked upon here with equal curiosity and distrust.

We were much interested, at Moabit, in witnessing the process of forging these wheels. Each arm is first forged separately, with its proportional part of hub and rim attached. These several pieces are next welded together to form the rough wheel, and, on each side of the thin hub thus formed by the union of the inner ends of the arms, is then welded an iron ring, making the wheel complete and ready for finishing in the machine shop. This makes an excellent and thoroughly reliable, but an expensive, wheel. Large fires and heavy steam hammers are employed in this work. There are twenty steam hammers in the forge shops. There was but little that was noteworthy in the

BOILER SHOP.

There were no steam riveting machines visible. The riveting was done by hand, but not as is usual in American practice. The rivet holes were punched a quarter inch or more smaller than the intended finished size, and were then drilled out to the full size. The rivets were roughly headed with the common light hammer and were then given their proper form—the snap head—with a die driven by heavy hammers.

In some cases the lighter hammer was entirely dispensed with. This makes a good job, and, particularly for heavy plate and large rivets, is probably much superior to the riveting so universally used with us. The conical head is not nearly as strong as the snap head, and it is far more liable to be injured by cold hammering in giving a finish. Where the strain upon the rivet is longitudinal, as where the braces are riveted to the shell, this difference is of great importance.

Like nearly all great establishments, this has grown up from very small beginnings. The first locomotive was turned out in 1841, and to-day the total number has exceeded 3,100. This prosperous growth has apparently been due to the energy, skill, and enterprise of one man, Borsig, its founder, and, in no small degree, to his exceptional interest in the welfare of his workmen, who learned to look upon him as a friend as well as an employer, and who felt a confidence in his regard for them which was never betrayed. Whether this trait in his character was a phase of simple benevolence, or was merely an evidence of his appreciation of the often forgotten axiom that "the real interests of employers and employed are identical," matters little. It probably came of both. The result has been the founding of a great establishment, and the founder has earned a most enviable name. A large wreath-crowned bust of this great man, who is now dead, is mounted at one end of the great dining hall of the locomotive works, and along the walls are suspended pictures of his most remarkable productions. Flags which bear legends, referring to celebrations of important events in the history of the establishment, are suspended above them, reminding the visitor of the display of battle flags in the Tower of London, or of the relics of our own sad civil war. These are trophies of a far more pleasing kind. At the

BAU-ACADEMIE AND THE GEWERBE-SCHULE

there is much to interest those who are engaged in this branch of education, yet not much that can be given here. The former has 650 students and has no room for more. There are 58 instructors. The model rooms contain some unusually fine models of bridges and a large collection of architectural and other models in plaster. The lecture rooms are quite well arranged, but do not compare favorably with those of many colleges in the United States.

The *Gewerbe-Schule* is more a school of engineering, and is one of the best in Europe. The buildings are very large and are quite well arranged; the lecture rooms are unusually well fitted up, and the collection of models and of illustrative apparatus is probably the best in the country. Several workmen are kept at work, in a machine shop attached to the school, making new models; and such students as desire to do so, and at the same time exhibit special talent, are permitted to work in the shop under instruction. The collections are thus continually growing, and the school, under the administration of Professor Reuleaux and his large corps of assistants, is doing a great and a good work.

After making valuable additions to our memoranda, both educational and technical, and paying a hurried visit to a few of the many attractions of Berlin, and after spending a pleasant hour with the distinguished historian and diplomat who so ably represents the United States at the Prussian capital, we reluctantly left our pleasant lodgings *Unter den Linden*, and started westward *vis à vis* Cologne and the magnificent valley of the Rhine. R. H. T.

Lard as an Unguent.

It is well known that rubbing the body with hog's fat has the effect of reducing the temperature of the skin in scarlet fever. A gentleman of our acquaintance has used the fat portion of smoked ham with beneficial results, and writes to the editor to disseminate the fact for others' benefit. A celebrated German physician recommends to incorporate one or two grammes of carbolic acid into one hundred grammes of lard, and, with this, to rub the whole body, excepting the head, two or three times a day, according to the intensity of inflammation characterizing the case in hand. The effect of this kind of treatment is to produce a pleasant feeling of coolness, to keep the skin softer, and after each application the temperature of the skin falls somewhat. The carbolic acid operates to destroy the germs and spores of the disease.

Packing Oranges and Lemons.

A full grown orange tree yields from 500 to 2,000 fruit annually, and arrives at the bearing state in three or five years, as does the lemon tree; both grow luxuriantly in most soils. The plantations (in the Mediterranean countries) are called gardens, and vary in size, the smallest containing only a small number of trees, and the largest many thousands. The fruit is gathered in baskets similar to peach baskets, lined with canvas, the basket being held by a strap attached and passed around the neck or shoulders. From the garden the fruit goes to the repacking magazine, where it is removed from the boxes, in which it was packed in the gardens, and repacked for shipment by experienced female packers, after having been carefully assorted by women, and wrapped in separate papers by young girls. As many as 500 persons (mostly women and children) are employed by some of the fruit growers in their gardens and magazines, in gathering, sorting, and repacking for shipment, the wages paid them varying from nine to sixteen cents a day. In sorting, every fruit that wants a stem is rejected. The boxes are then securely covered, strapped, and marked with the brand of the grower, when they are ready for shipment. Twenty years ago, this trade was nothing in its commercial characteristics, or the inducements it offered to capitalists. Now it is progressing with giant strides into prominence, and is a considerable source of revenue to the government.