

an example the cylinder tubular boiler; the same rules apply to the two or more flue or cylinder boilers.

In case the duct from the boiler to the chimney is carried under the ground, great care should be used to have it so arranged as to be easy of access for clearing, the upright part and in the angles large, and that the duct be either square or round, not a parallelogram, in order that as little surface as possible may be presented to the passing current.

These under ground ducts have sometimes given trouble in certain localities, in sugar houses, distilleries, breweries, and other places where fermentation is going on, liberating large quantities of carbonic acid gas, which being heavier than air fill the lower spaces and render it impossible for the products of combustion to pass to the chimney until the gas is removed. We have done this by exploding a few ounces of gunpowder by means of a slow match in the duct, taking care to have the breeching closed so that the gas be blown up chimney.

The above difficulty only occurs when the boiler is newly set, or has been standing cold for some time.

EDITORIAL CORRESPONDENCE.

Who is Prussia?—The Question Answered but not Settled—The German Spirit and its Characteristics—The King—His Habits—Bismarck, the Iron Man—The Habits of the People.
BERLIN, July 23, 1867.

In the show window of one of the numerous shops in the beautiful street called "Unter den Linden," is a characteristic double picture. One represents a solitary mounted figure clothed in the splendid uniform of an Austrian Huszar. Underneath are the words, "Who is Prussia?" The other represents two mounted cavaliers—one an Austrian, the other a Prussian. The latter answers laconically "Here is Prussia," having, in the mean time, drawn his sword and knocked off the Austrian's cap in the coolest manner possible.

Such, at this moment, is the situation of the two nations which the group represents. Austria seeking to control the destinies of the German Confederation, finds in Prussia a power to dispute her claims, and in the seven weeks' war of 1866, the former inquires "Where is Prussia?" One year ago, on the sanguinary fields of Koniggratz and Sadowa, the question was answered, "Here is Prussia."

Germany has always puzzled me a good deal—and when the question has been asked, "Where is Germany?" the answer has been: Austria, Bohemia, Bavaria, Westphalia, Wurtemberg, Saxony, Prussia, Hanover, Hesse Cassel, Saxa-Coburg, Saxa Weimar, besides a score of other petty Dukedoms—a sort of mosaic work of little states—so that a traveler is fairly bewildered by their number. At one time the provinces of Rhenish Prussia could not be reached from Berlin, in a direct route, without passing through territories governed by other rulers. The success of Prussia in war has altered this state of things, and now she has a free pass to go in a straight line. The King of Hanover has voluntarily exiled himself rather than to yield his regal rights, but his Queen refuses to go, and is compelled to submit to the authority of the King of Prussia, who, it is said, appoints her household servants. The Duke of Nassau, for the same reason, takes up his abode in the mountains of Switzerland, and reminds his people that for six years his father was wrongfully deprived of his ducal rights, and if need be, he can stay away as long. It must not be supposed that the success of Prussia in war has made a homogeneous people. On the contrary, while the population on the lower Rhine shout lustily, "God save the King and Bismarck," up the Rhine, and much nearer to this capitol, there is a sullen bitterness of feeling which often vents itself in language of unmistakable disapprobation, and the presence of the most loyal troops are required to secure obedience.

Military surveillance, however, is not so rigidly exercised over the people in Prussia as it is in France. The Germans are a brave and well educated people, and it would not be safe to undertake to reduce them to a position of military vassalage such as exists in Russia, Austria, and, to a great extent, in France, where the masses are unlearned, and by long habit have bowed the neck to the most grievous burdens.

It is said that every soldier in the Prussia army is able to read and write. By law all the children, male and female, between the ages of six and fourteen, are compelled to attend school. They are taught reading, writing, and the elementary studies generally, to which is also added singing and religious instruction. It is not at all strange, therefore, that in time of war an army so composed should be strong and reliable—a band of Spartans who fight for "God and Fatherland." The whole population is trained for war, but not for the army, so that when the war-cry is sounded the people drop their implements of peace and seize the musket, to the use of which they are thoroughly well skilled. Two years ago King William and Bismarck were very unpopular, but the events of 1866 have rendered them both objects of mingled pride and popularity. Had they failed, a fearful retribution would have covered them with oblivion and contempt.

King William is in one sense an accidental Sovereign, for although of the royal family, he succeeded to the throne in 1861 upon the death of his brother, who left no heirs. The shop windows of Berlin testify to the general admiration in which the King is now held by the people. The photographic art seems to have exhausted itself in presenting him in almost every posture that befits his position, and the chisel is now being employed to mold the kingly features into comely form, though it must be confessed that His Majesty is by no means a poor subject. He has a somewhat commanding figure, a bright blue eye, with a smiling open countenance, which reveals a great deal of the *bon homme*, while his habits

are very simple and correct. At his summer residence of Babelsberg, in Potsdam, either himself or some one else has shown a great deal of excellent taste and good judgment. It is not exactly a palace; on the contrary, it has the outward air and style of a fine place upon our own romantic Hudson. The gardens are very beautiful and well kept, and but for a knowledge of the fact beforehand, nothing inside would indicate to the visitor that it might not be the residence of some private gentleman who had plenty of money to purchase fine pictures and other rare and beautiful objects of art and *virtu*. The bed-chamber of the King is a curiosity, for instead of finding richly carved furniture, garnished over with tinsel, the visitor sees a small plain cottage bedstead made of maple wood, and provided with a blue cotton chintz curtain and a leather pillow, while upon the walls of the room there are no ornaments other than some neatly framed steel engravings, chiefly of battle scenes. The sitting room adjoining is also quite simple, and with the exception of many beautiful small articles, it is less elaborate, and much more sensibly furnished than would satisfy some of our would-be nabobs who ape the manners and customs of aristocratic wealth. The King was at one time excessively fond of the chase, and the halls of Babelsberg, in the number of mounted stag and deers' heads, abundantly testify to the skill of the royal hand.

Bismarck is the power behind the throne—"an iron man"—who destitute of that magnetic influence which draws the multitude—insensible to fear, and courting not the eclat of popular applause—furnishes the State with cold, calculating brains. Gen. Moltke, a name but little known in our country, is regarded by the Prussians as entitled, more than any one else, to the credit of the military plans of the campaign of last year. The Royal family, in the persons of the Crown Prince and Prince Frederick Charles, distinguished themselves as commanding generals. They both exhibited the characteristics of Frederick the Great, who could play the flute, write poetry, and fight a battle.

To speculate upon the future of this nation is useless; but certain it is, that the people so suddenly expanded are by no means free from apprehension that in some way a new war is approaching; but I trust that human sacrifice to elevate and maintain Kings and Emperors, who seem to be a great set of commercial and political robbers, may finally come to an end in the universal peace and brotherhood of nations. I cannot, however, dismiss this subject without expressing a word of commiseration in behalf of the present King of Saxony. He was just stupid enough to sympathize with Austria. The result has been, that though occupying his royal palace at Dresden, he has really none of the attributes of a King. His army is commanded by the King of Prussia, and he has not even the poor privilege of controlling his own telegraphs, post-offices, and railways, and even his custom house appears to have disappeared, as no examination of baggage took place on the Saxon frontier. The Saxons say he is still king; but ask them how, and with a shrug and a grunt they answer, "we don't know."

The soil of Prussia is generally poor, but by patient industry and careful tillage it has been made to yield an abundance of grain, grass, and fruits, besides horses, cattle, swine, and geese, which seem to abound in the more northern sections. Her natural productions of iron, lead, copper, silver, salt, coal, marble, and granite are very abundant, while the mountains and forests afford a generous supply of wood and timber. The Germans are a steady, industrious, and externally moral people. A very rigid pietist would exclaim that they are an irreligious people. To some minds of peculiar caste this might easily be made to appear, but a somewhat careful observation satisfies me that such a charge would be in a great degree unfounded. Throughout the large cities and towns there is much less external vice than appears either in our own Country or in Great Britain. They all love their wine and beer, but gin, rum, and whiskey are not used, therefore drunkenness in the public streets is rarely ever seen. In the city of Leipzig, which contains 85,000 inhabitants, there were only thirty arrests made for drunkenness in three months. Can the same be said of any city in the United States of one half the size of Leipzig? The Germans go to church on Sunday. Their churches are generally well filled, and as for their congregational singing, it cannot be beaten. At nearly all their churches, both Protestant and Catholic, the choirs are made up of the whole body of worshippers who pour out their music in most rapturous strains. It is impossible that this land of philosophy, science, literature, and song—which gave birth, also, to the great Reformation, should be essentially immoral or irreligious. The Germans, it is said, resort to the beer garden on Sunday. That is true; but no one can fail to notice that the most perfect decorum is always observed, and without the presence of the police. I think, however, that the universal habit of swilling beer by all classes, old and young, which obtains throughout all Germany, is a bad practice, and tends very materially to destroy those finer physical developments which are more common among the rural population of our country. The people, however, are amused in very simple ways, and seem to be happy. They are provided with parks, museums, open air or suburban gardens for beer drinking, concerts, and plays, all of which suit their gregarious habits. Therefore, as regards the habits and moral character of the people, I do not see that in the aggregate we have any superiority to boast of.

Berlin is a fine city. The public buildings and palaces are numerous and usually very fine specimens of architecture, and by no means wanting in taste in the interior adornments. The museums and picture galleries are rich in ancient and modern curiosities, sculptures, and paintings. I was particularly pleased with the very superb collection of Egyptian antiquities, which is said to be one of the most curious in Europe. Such museums constitute great educational estab-

lishments which instruct the whole people. The streets and public places of Berlin abound also in fine memorials to the great men of the nation, but owing to the flatness of the ground in and around the city, for miles in every direction, much of the fine architectural effect is lost. The weather has been miserable. I have never before experienced such cold weather in mid-summer. On the 20th of July, wrapped in an overcoat and dressed in winter clothing, I was stirring about the streets of Berlin in search of health and curiosities.

S. H. W.

Special Correspondence of the Scientific American. MARINE ENGINES AT THE EXPOSITION.

PARIS, July 23, 1867.

The number of large marine engines in the Exhibition is not great, there being not much over half a dozen, and of these but one is in motion under steam. There is, however, a tolerably large collection of models, many of them executed at great expense and showing perfectly well the design and construction of other forms of engines. In the French annex, the engines for the *Friedland* have been erected, with the line shaft and screw propeller in place, and are to be supplied with steam from two of the eight boilers which the engine will require when in actual service. In another building, devoted entirely to the objects from the works of Messrs. Schneider & Co., Creusot, are two marine engines, one a three cylinder back-acting, and the other having but two cylinders of smaller diameter. In the Swiss annex is a paddle engine with two inclined cylinders, and lastly, in the English building, is an engine built by Messrs. John Penn & Son, and of their usual type of trunk engine. Beginning with the last mentioned, there is nothing strikingly new in design to notice, but it is remarkable for the beauty of the workmanship throughout, from the smoothness of the castings to the finish of the rods and bearings. The main pillow blocks are formed in well ribbed castings projecting from the face of the cylinder, and on the other side of the shaft are placed the condensers and air pumps, connected with the cylinders and framing only by the sole plate. The air pumps are placed quite low down, so that this connection comes very near the line in which the strain of the pumps will act, and is ample for sustaining this. The pumps are worked by rods, directly from the pistons of the engines. The exhaust passes from the cylinders through copper pipes over the shaft. The momentum of the reciprocating parts is counterbalanced by weights secured to the back of each crank cheek by a wrought iron strap passing around the latter, an arrangement which brings the counterweight just where it should be, while the straps are finished in such a manner as not to disfigure the crank shaft. The link motion is used for reversing, in combination with another valve placed above the steam chest for cutting off at any point from one third to one fifth. There is, of course, the objection to this arrangement, of the large space beneath the cut-off valve. The engine has surface condensers, the tubes being arranged in a vertical, cylindrical casting above the air pumps, and covered at the top with a large bonnet. The condensing water is supplied by a pair of centrifugal pumps placed back of the condensers and driven by a very neat pair of vertical engines, with the cylinders above. These, though constructed entirely separate from the main engine, are placed so as to be within reach of the engineer standing on the platform, for starting the engines. This first pair of engines is kept in motion by a portable engine connected by gearing to its shaft coupling. Messrs. Penn & Son have also on exhibition a set of twin screw engines with boiler, such as they make for ships' launches, and intended to work at a high speed. The boiler is of the locomotive type, and the cylinders are bolted to the sides of the fire box and the shaft bearings also lower down, but the strain between the two is sustained by a strong bolt passing directly from one to the other. In the same room is a working model of one quarter size of a pair of vertical screw engines by Wm. Denny, of Dumbarton, kept in operation by steam from the boiler of the portable engine already referred to. The central space of the engines is occupied by the surface condensers, the cylinders being placed above these, and having their guides formed on the sides of the condensers. These engines are said to be very much liked where in use. Messrs. Humphreys & Tennant also exhibit two beautifully executed models of their styles of engines, on a scale of one twelfth full size. One represents a form of engine which has been advocated for some years by this firm, in which the required economy of room athwart ships is obtained neither by back action nor the use of a trunk, but by employing a very short connecting rod. The makers argue that the amount of friction caused by the great inclination of the rod, is after all not excessive, and preferable to the evils attending the other modes of construction. Their other model, however, is of the more usual back-acting type. Four piston rods transmit the motion of each piston to its cross head, and the air pumps are also worked directly from the pistons. These makers have established a reputation for the construction of very economical engines.

The rest of this annex is chiefly devoted to models of ships, both of the navy and those constructed by the principal British builders for the merchant service, at home and abroad. The former comprises a collection of half models of all the screw vessels constructed for the navy since the introduction of the propeller. The changes that have taken place in the forms of vessels in the last quarter of a century, are very strikingly shown by these models, and of these changes, the most remarkable are those which have occurred since the adoption of iron plating, and rams.

The larger Creusot engine is intended for the iron-clad *Ocean*, and is of 950 nominal horse-power, but will work up to 3,800 actual horse-power. It is quite similar in its most