

ment at Elswick, Newcastle-on-Tyne, which he had founded in conjunction with some friends.

A few words will not be out of place here about this remarkable man's career. Born in 1810, he displayed very great aptitude for mechanics, but was articulated to a solicitor at Newcastle, according to the wishes of his father, who was a merchant of the ancient coal city and an alderman. But his scientific bent drove him from the lawyer's office and set him on a remarkable inventive career. He began with electricity and then revolutionized hydraulics. In this connection he had when still very young made the leading name in the world. His inventions had been applied to cranes and hoists of all kinds, to dock gates and spring bridges, turn tables, wagon lifts, and numerous other things. It was this development of inventive genius that founded the Elswick establishment, before the success in gunnery.

In 1863, the superiority of the gun had been so fully admitted that the increase of the Elswick establishment became necessary. Sir William Armstrong, therefore, severed his connection with the Government service, returned to his partners at Elswick, and in a short time expanded the concern into one of the largest and most important manufacturing establishments in Europe. Its history is largely a history of the patents of Sir William and his friends; and we may here mention incidentally, that no man ever had a greater dislike to the patent laws of his country in the shape in which they disgraced it in his day: and no man did more to bring about a better state of things. To follow the story of his life would be impossible to-day. Enough that he earned fame from the world and honours from many of its governments. He possessed the Orders of Denmark, Austria, Spain, Brazil, Siam, China, and, of course, Britain. It is suggestive that he did not obtain such recognition from Russia, France, or Germany. From which it is clear that he can not have done anything for those countries. The fact reminds us that the artillery of those countries is supplied by Krupp of Essen and the French establishment at Creusot. This may one day be a cause of congratulation to the nation and perhaps the Empire.

Elswick on the Tyne is not the only establishment owned and worked by the firm. Besides the ship yards, gun works, and steel works at Elswick, there are gun works at Openshaw in Manchester, an offshoot where 8,000 men are employed: and there are ammunition works at Erith on the Thames. Our illustrations give a fine idea of the arrangement and power, rapidity and efficiency of portions of the Elswick and Openshaw establishments. The long row of the completed guns is suggestive in its perfect simplicity and the enormous weight of the pieces handled. The industry of making turrets for battle ships for these great guns to live in is brought vividly to mind, the rolling of great plates and other processes that tax the utmost resources of lifting, moving, welding, planing, and carrying are shown and the predominant note is of the ease with which everything is accomplished. In an establishment so well ordered the nation can, like the Government of Great Britain, have every confidence.

A New Zealander lately returned from a visit to the old country has given us an

interesting description of the making of a gun which he witnessed in one of these departments. He saw a huge mass of metal brought red hot out of a mighty furnace by a crane. As no human being could go near the mass and live, the subsequent work was all done by machinery worked by signal. Grippers seized the mass of metal, placed it on an anvil, held it for the blow of a towering hammer, and between each blow deftly gave it a turn just as a blacksmith's assistant might turn a little bar his chief is shaping on the anvil. And so for the other processes. When they got to the rifling, the human element came in. A high expert took charge and setting the instrument for the rifling proceeded to guide it with his hands with marvellous skill until the work was done.

Our informant stayed to see all this because the gun happened to be one of the armament for the battle ship "New Zealand".

The German Reply.

The German view is different. Count Reventlow gives it in Cassier's magazine for October last. He begins by describing the futile attempts of thirty years back to get a navy at all for Germany owing to the failure of the German people to see the need for defending their commerce. In the eighties' the navy was in a very incomplete state. In 1888, a general had command over the navy. In that year Admiral Tirpitz was appointed and things went on apace, Tirpitz proving himself the Fisher of the Fatherland. A Naval Act was passed in 1900 but the Navy League was not strong enough to influence Parliament. It was consequently difficult to get an adequate programme passed. But at last, owing to the spread of the League, and to the supply by England of material (building of Dreadnoughts to wit) for the support of applications for more money and an extended programme, the ships were made bigger individually and the programme enlarged also of the building, to the dimensions stated above, namely, thirty-eight Dreadnoughts and the rest in proportion. In 1900 the German Navy was a negligible quantity, now it is on the high road to become worthy of a first-class power. "The real line of thought is: we are not in a position to build a fleet as large as England's, nor do we think of doing so. When creating or planning a means of defence, in measuring its strength all possible adversaries must be taken into consideration. England, the greatest naval power is naturally among these possible adversaries. We shall never be equal to her for we know that England has possessions and interests to defend all over the world. If, however, we brought our navy to such a standard that a war with us would cost England so many ships that she would not be able to protect her interests elsewhere as heretofore, then we should feel satisfied that England would not attack us. I think this is a programme which clearly shows its purely defensive character."

Admiral Tirpitz for these reasons in explaining the new programme to the Diet alluded strongly to the need for acquiring such a position that the "greatest sea Power" would hesitate before attacking Germany for fear of losing her dominant position. This Count Reventlow complains

has been misunderstood in England. England, he says, is of course the greatest sea Power alluded to by the Admiral. But the mention by Tirpitz of England was illustrative and no more.

Such are the two views in this crisis. Time will decide between them.

Miscellaneous.

Gas Heating—A Healthful System.

Who has not heard of the objections to the usual gas stove? Who has not felt them from time to time with protest? Who has not desired to get something more comfortable, more cheerful, and less smelly? All will be pleased to learn that this desire has now been fulfilled. During many years, about fifteen to be accurate, the improvement in gas lighting has been very great, a fact to which the good light maintained by gas against electricity is mainly due. The scientific construction of the Welsbach Kern Burner is such that in actual practice the admixture of gas and air is exactly what is required by technical theory for complete combustion of gas without waste or by product. This end having been achieved, the application of the Welsbach Kern Burner to the science of gas heating became a natural step. The flame of this burner is extremely brilliant, and as there are no unburned products, the heat is purer considerably than under systems in which the conditions of combustion are less favourable. This pure heat is applied in the Welsbach Kern Radiators to specially prepared perforated fireclay tubes, and the result is a bright red heat realising the universally admitted "need of a cheerful fire".

Heat by Radiation is the ideal system of artificial heating, by which heat particles in encountering solid objects, impart their heat to them, and thus the heat of a radiating fire is communicated across space. The freshness or vitality of the air is in no way disturbed by the passage of the heat particles through it, therefore radiated heat is healthy heat, whereas the contrary method of heating produced by warming the air in contact with super-heated surface, has in the light of knowledge and experience come to be regarded to be as unhealthy as it is oppressive.

For the Welsbach Kern Radiator three advantages are therefore claimed: namely correct admixture of gas with air, high heating efficiency, and the generation of nothing but radiated heat, the only really healthy form of heating. In actual practice these Radiators are furnished with patent gas regulators which ensure simplicity and convenience of working. Hence the collateral advantages of freedom from dirt, saving of labour, and the maintenance of any desired temperature. It is worth remembering that the *Lancet* which never allows anything good in the hygienic line to escape its notice says of this invention many good things, this amongst the rest: "We doubt whether such an output of radiant heat has ever before been attained at so little cost, and so low an expenditure of gas."