MECHANICS, PHYSICS, AND CHEMISTRY.

On the Iron-making Resources of the Kingdom, and the First Process in Iron-Making. By S. H. BLACKWELL, Esq., of Dudley, F. G. S.*

The lecture commenced with a graceful reference to the Crystal Palace, which had brought so prominently into notice the great iron-making resources of the kingdom, and the extraordinary perfection to which some of the branches of that manufacture had attained, while it illustrated no less how those resources underlie all the departments of our manufactures, and form the basis on which all progress must rest.

The history of the iron trade may be divided into two periods—the first, terminating at 1740, when coal was introduced as fuel for smelting; the second, extending to the present time.

In 1615 there were in the whole kingdom 800 furnaces, yielding 180,000 tons; and in 1740 these had declined to 59 furnaces, producing 17,350 tons. At this period coal was introduced, and the rise was thenceforward rapid; in 1788, 70,000 tons; in 1800, 180,000; in 1825, 600,000; and in 1851, 2,500,000. In the same year, the exports of pig iron were upwards of 1,200,000 tons, besides tin plates, hardware, cutlery, and machinery, bearing a total value of £10,424,139.

The causes of this wonderful increase are mainly three—the rapid expansion of our arts and manufactures; the improvements in machinery; but, above all, the vast supplies of coal and iron contained in our mineral fields, and their happy proximity to each other, by which the ore and the coal for its smelting are obtained from the same working.

A class of ores is likely to prove so important, that some notice of it must be given. It commences on the north-east coast of England, at the river Tees, and stretching through York, Lincoln, Northampton, Oxford, and Dorset shires, is at Lyme-Regis diverted by the granite formations of Devon. Its discovery was first made at Middlesboro', between two and three years ago, where the bed is fifteen feet thick, and contains thirty per cent. of iron; and so low is the cost of its production, that the manufacturers of that district have been enabled to compete with the maker of iron from the Scotch black bands. Some idea of the extent to which this bed will ultimately be worked, may be gathered from the fact, that although the workings have been so recently commenced, 200,000 tons of stone were raised by one firm alone in the course of the past year. This ore differs in appearance and structure from any other, and on this and other accounts, although the existence of the bed in Northamptonshire had been long known, and traces of the ancient workings were to be found, it had been neglected, and it was only by the Exhibition that its extent and value had been ascertained. The supply of this iron-stone may be fairly considered as inexhaustible—that from Higham-Ferrers, in Northamptonshire, where many tracings of ancient workings have been found, yielding 55 per cent. of iron.

The lecturer then proceeded to notice the improvements in the manufacture, by which, in little more than a century, a larger quantity is now

* From the London Practical Mechanic's Journal, July, 1852.

produced by two furnaces than by the whole number in blast in 1740; while, by several single firms, fivefold the whole make of the kingdom at that period is produced.

The reduction in prices resulting from these improvements has naturally been very great, and pig iron has now fallen from 8*l.* per ton, the average in 1820, to 2*l.* 12*s.* 6*d.* It is not uninteresting to remark, that the quantity exported in the past year, with the duty on foreign iron at 30*s.*, is double the entire make of the kingdom in 1825, when the duty was reduced from 6*l.* 10*s.*

Not the least interesting part of this important history, is the consideration of the obstacles opposed by prejudice and ignorance to each successive improvement. Although the use of coal was attempted as early as 1620, the opposition on the part of the workmen was such, that its successful application did not take place till more than a century later. For a long time the most eminent firms refused to make use of the hot-blast, although now more than $\frac{1}{10}$ ths of the whole produce of the country are made with it; and the application of the waste gases, although adopted most successfully in Scotland, Derbyshire, and South Wales, has hitherto failed to make its way into South Staffordshire.

An important result of the Exhibition is the acquaintance it has given us with the iron manufactures of other countries, which, in many cases, showed an excellence which we have not yet attained, but which we must reach if our pre-eminence is to be maintained. It is a dangerous mistake to suppose that we are possessed of any exclusive skill in manufacture, or that our immense natural advantages will enable us to retain the position which we hold without straining every nerve to do so. The lecturer concluded by warning the Anglo-Saxon race, "to whom work is less a toil than a passion," that with their faculties and natural privileges, they also bear the responsibility of the progress of the world.—*Proc. Soc. Arts*, April 7, 1852.

For the Journal of the Franklin Institute.

Remarks on the U. S. Steamship Susquehanna. By B. F. ISHERWOOD,
Chief Engineer, U. S. Navy.

In 1847, the United States Navy Department commenced the construction of the four steamships-of-war, *Susquehanna*, *Powhatan*, *Saranac*, and *San Jacinto*, all of which are now completed, the latest, the *Powhatan*, having made a trial trip in May last.

The *Susquehanna* left the United States on her first cruise, in June, 1851, for the East Indies, by the way of the Cape of Good Hope, and returns have been received up to January, 1852, which show her to have been signally fortunate on her passage, being favored with fine weather nearly the whole time, and with fair winds during a long portion of it; consequently, she was able to derive very great benefit from the use of her sails. Owing to the same cause, there were no opportunities for testing her steam capabilities, as the engines were not worked with wide throttles and all furnaces in operation for a sufficient length of time to obtain reliable average data; from the same cause, likewise, and the