mic point of view, may be illustrated by the following ex­perimental facts.

In a given furnace in Scotland, previous to the introduc­tion of the new process, the following was the average re­sult obtained :

20 tons of coal (coked), with 31/2 tons of limestone, smelted 41/2 tons of iron,

being 31/2 tons of fuel to each ton of iron.

In the same furnace, by the introduction of the new pro­cess, the result was as follows :

14 tons of coal (raw), with 21/4 tons of lime, smelted 8 tons of iron,

being 13/4 tons of fuel to each ton of iron.

Here, then, we see that, in the first place, one half of the fuel only is required ; that coking, a very expensive process, is avoided, the coal being used raw, which was formerly impossible; and that only about one-third of the quantity of limestone is required to flux the iron, and all the cost of these materials, and all the labour employed in their transport, and in the process of melting, are clearly saved. But these were not the only benefits conferred on the iron-master. The same furnace, blowing apparatus, and establishment, that formerly produced fifty tons a-week, yielded under the hot blast more than double that quantity.

As it was in Scotland that these advantages were first obtained, so it is there that they are still possessed in the highest degree. Previously to the introduction of the hot blast, it had become an almost hopeless competition to pro­duce iron there at so cheap a rate as the Welsh iron-mas­ters could import it into Scotland. The hot blast at once turned the scale; and Scotland now transmits annually many thousand tons of iron to all the markets of England, and even into the very heart of the iron districts of the principality itself.

The cause of this difference between the advantage which Wales has derived from the hot-blast process, and that conferred on Scotland, is simply this : the coal fields of Wales are a rich, strong, and highly carbonaceous fuel, which loses not more than thirty to forty per cent. in the process of coking. The coal basin of Scotland in the iron district is, on the contrary, of a poor, earthy, light descrip­tion, so as to lose from fifty to sixty per cent. in the pro­cess of coking, and giving, for every two tons of coal, not more, and frequently much less, than one ton of coked fuel fit for the cold-blast smelting-furnace. The expense and loss in the Scotish coal by this preparatory process of cok­ing, was therefore excessive, when compared with the Welsh coal ; and hence the adoption of this new plan, which did not require this preliminary process of coking, became a much greater boon to the Scotchman, in exact proportion to his former disadvantage.

Great as these advantages have been found in Scotland, they have by no means been limited to the country of the inventor. In Staffordshire, in the wonderfully rich mineral basins of Dudley, and in Derbyshire, the invention was very early introduced, and most successfully practised. The following are the general results of the hot-blast sys­tem, as now practised in Staffordshire, in comparison with the old system :

By the cold blast,

8 tons of coal (coked), with 11/10 ton of lime, yielded 3 tons of iron,

being 22/3 tons of fuel to each ton of iron.

By the hot blast, in 1840,

21/2 tons of coal (raw), with 6/10ths of a ton of limestone, yield 21/2 tons of iron, being 1 ton of fuel to each ton of iron.

The saving thus obtained in the article of fuel, is accom­panied, it will be noticed, in every instance, with a corres­ponding saving in the limestone employed to flux the metal. But even here the whole amount of advantage does not meet the eye. It was formerly important to use the very best quality of coal that could be obtained,— light, bituminous, or earthy coal, being least fit for the purpose, and most unprofitable. Now, although it is still desirable to have a better rather than a worse fuel, the importance of this point is so greatly diminished, that almost all the inferior descriptions of poorer and more bituminous coal may be employed with economy and advantage. Lime­stone of the best quality was essential to the produce of good iron by the old method ; by the new method, it is obvious, from inspection of the examples given, that the saving in limestone varies from a third to two-thirds of the quantity employed ; but, in addition to this, it has become practicable to employ limestone of a very inferior quality, where better may be scarce, without sensible deterioration of the metal.

For the production of good iron, the hot-blast system has thus opened vast resources, which formerly could not be rendered available, in consequence of the inferior quality of some one of the raw materials which could be brought together in a given locality. In one place, abundant in excellent carbonate of lime and rich ore, it became im­possible to realise the mineral wealth, on account of the in­ferior quality of the coal ; while, in another, an abundant supply of good limestone, and of good coal, could not be used with advantage, from the poverty of the ore, which happened to be a clay stone, containing a small proportion of iron. Perhaps, also, a portion of sulphur mixed with the materials in such a quantity, as to ruin the iron. These all are counterbalanced by the hot blast, and every one of these impracticable cases is now exemplified in daily use.

But there is no sphere in which the hot blast Jias exerted a more beneficial influence in promoting the success of in­dustry, and extending the resources of civilization, than in its application to those sterile districts of the mineral world, known as the region of the stone coal, blind coal, or an­thracite formation. In the blind or stone coal strata, we have that most valuable of all combustibles, carbon, in a condition of high density and purity, amounting to as much as ninety or ninety-five per cent. of the stone coal, with a very small per centage of earthy or hydrogenous matter, yet so contracted, and, as it were, iron-bound, so hard and obdurate, that, instead of forming a good combustible, it seems to partake of the nature of that wonderful and bril­liant substance, so hard of combustion as to have been reckoned one of the incombustibles until the glass of the accomplished analyst resolved the glittering brilliant into its primitive carbon. The anthracite seems, in fact, truly to deserve the name of the “ black diamond,” having been rendered, by its dense and close structure, nearly as in­combustible. Although America, and many wide districts of Europe, abound with this rich carbon, it has failed to furnish, even in the hands of many accomplished chemists and mechanicians, an available fuel, either tor the genera­tion of steam, or for the ordinary wants of social life, and has resisted even the intense heat of the blast furnace. But even its consummate obstinacy has yielded to the power of the hot blast. In Wales, and in America, hot- blast iron of the very finest quality is now made from stone coal ; and thus stores of the richest fuel which the world contains, appear only to have been reserved, by their won­derful obduracy, from the rapid destruction to which all other fuel has been so wastefully subjected, to supply the civilization and science of the nineteenth century with the means of rewarding and extending its astonishing disco­veries. So kindly has Providence placed at the surface of the earth one mineral fuel to replace the forests which supplied the fires of our forefathers, and deposited ano­ther still richer, but more remote in the bowels of the earth, to await and to reward the industry and research of