

which, as some of us knew, veiled a real irony, proposed the health of the youngest man at the table, our distinguished guest, whose arrival had been so long anticipated and so eagerly hailed.

All drank the toast, and there followed an awful pause. Every eye, Eleanor Hartley's amongst the number, was fixed on our new-comer. He rose to his feet, and I ventured to glance at her. All was explained.

Oh, woman, what a strange being you are! Soft and yet triumphant was the beautiful face of our queen. She was bending a little forward: her eyes glistened: you would have said that she was listening to some exquisite melody.

About him, too, there was a change. I was excited, and of course what I saw and heard was coloured by my mood, but I could have declared that the young man's form had expanded, and that an indescribable dignity had crept into his gestures. He stood upright, his voice was clear and unflinching; he did not shrink from, he rather courted, the multitude of glances that were bent on him. As for his speech—sir, I have knocked about pretty much, as you know, and now and then at dinners and elsewhere I have knocked up against distinguished men, but I have never heard a speech to match this one. In substance it was a review of the time he had spent in the settlement. To hear him one might have believed that he had seen

through our practical jests from the first, and while seeming to be their victim, had been quietly amusing himself at our expense. Its manner, the delicate irony, the wit, the forcible piquancy, I should be glad indeed to reproduce, but of such an effort I am incapable. Here was a turning of the tables! My friends were bewildered; those not in our secret applauded vociferously. I alone knew who it was had planned this triumph; and I was not surprised when, a few days later, it was rumoured abroad that Eleanor Hartley and our new-comer were engaged to be married. Rumour, for once, told a true tale. Before that cold season was over, I was invited by Eleanor Hartley's father to his daughter's wedding.

"And I would wager," said the gentleman who had asked for the story, "that my lady kept him in order."

"On the contrary," replied our guest, "she was a model among wives—devoted, adoring. I believe she thought that man half divine. Well, poor fellow! he was always delicate, and, after two or three years of happiness, he died."

"And his wife?"

"I think you have met her."

"What! She cannot be——"

"I see that you have guessed. Thank me for giving you a peep into the character of Eleanor Walthingham."

C. DESPARD.

OUR STEEL MANUFACTURE.



THE ages of stone and bronze have passed away, and that of iron has already given place in some respects to that of the metal which will some day replace it fully,—steel. Already on railways the reign of steel has been inaugurated; in ship-building, in the manufacture of tools, and for other purposes, there is an increasing use of steel, and as its greater durability is proved, and as the difference in cost between the two is lessened, there will be a decreased use of iron. For a long time the use of steel was restricted by its great cost and the comparatively small production possible; but the invention of new pro-

cesses has removed both these obstacles, and as they have been removed gradually, the result has been seen in an increased use of the metal. But that increased use is contributed to by the fact that the "steel" we use so largely now varies greatly from that which once only bore that name. Down to a recent date, the process of "cementation," as it is called, was that almost exclusively used for the steel manufacture, but the discovery of the Bessemer process has not only changed the chief mode, but it has introduced a new kind of steel, cheaper, more easily made, and one capable of an expanded use; and this change has materially modified the steel manufacture and introduced it into districts where it was previously unknown, or where it had died out. Prior to the discovery of this process, the production of steel in Great Britain was very small—a few thousand tons annually—but by the adoption of the Bessemer and Siemens-Martin processes the production has been increased until it is now about a million tons yearly. The works by which this large growth has been contributed to have been erected in different parts of the kingdom, and the citation of a few figures from the official "Mineral Statistics," supplemented from local sources, will indicate the position of these works, and also the source of our steel supply, and the comparative production of different districts of the kingdom. As to the chief mode of production,

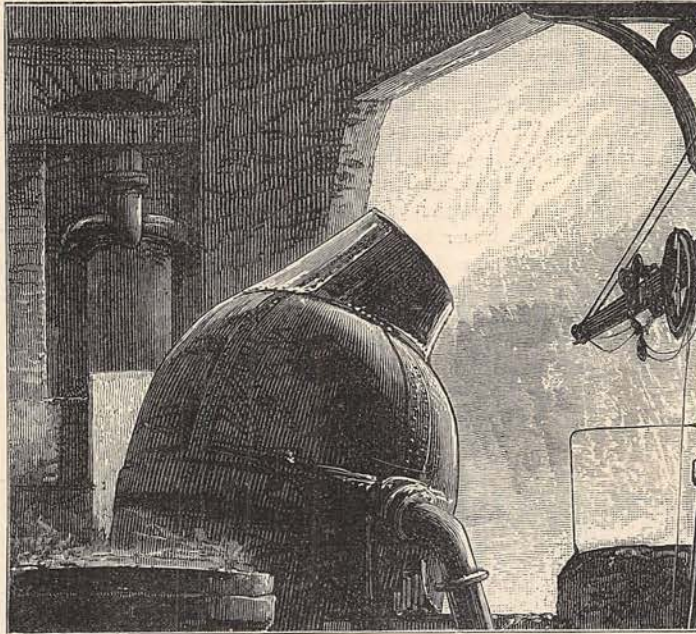
the producing capacity is best stated by the capacity of the "converters," and these in number, capacity, and location, are as follow:—In and on the borders of Sheffield there are 24 converters, the capacity of which may be stated as varying from 2 tons each to 10 tons each; Manchester has in its district 10 converters, of from 3 tons to 6½ tons capacity; Liverpool has 10, of 5 tons capacity; in the North-west, at Barrow, Workington, and Carnforth, there are 26, the capacity varying from 6 to 7 tons; at Dowlais and Ebbw Vale, 12, of 5 and 6 tons capacity; at Greenwich, 2, of 5 tons capacity; at Glasgow, 2, of 3 tons; at Deepcar and Wednesbury, 12, of from 3 to 5 tons; at Crewe and Bolton, 6, of from 3 to 6 tons; and at Ferry Hill and Eston-in-Cleveland, 8, of from 2½ tons to 8 tons capacity. In the total there are about 112 converters in Britain, and it will be seen that the North-western and the Sheffield districts contain half of the whole. In addition to the Bessemer process of manufacture, there are the Siemens and Siemens-Martin processes, and so far as can be learnt there are about 90 furnaces in the kingdom erected for the manufacture of steel by these modes. And of these, and the "Siemens Regenerative Gas Furnaces," most are in or near the ancient seat of the British steel trade. In that district, the bulk of the older form of appliances are at work, and it retains much of the famous trade it has acquired. But so far as regards the newer processes, by which the larger portion of the steel manufactured in Britain is made, there are some circumstances which militate against it, and which favour other districts by enabling them to manufacture more cheaply.

Although Britain is plentifully gifted with iron ores, there is far from a varied and extensive disposal of those rich ores which are necessary for the steel manufacture. The only district possessing a deposit of such ores in very large quantities that we have is the North-western district; and thus since the discovery of the Bessemer process there has grown up, as we have seen, a large manufacture of steel in other parts of the kingdom. In addition, there is now a large importation of ore into the kingdom, and on the Welsh and Cleveland coasts large steel-manufacturing establishments have been erected, with the obvious

intention of minimising the cost of carriage of the raw materials, and of that portion of their product intended for exportation. The largest portion of our British ores are not, under present conditions of manufacture, suitable for conversion into steel, because they contain vitiating elements; and the problem of metallurgy has been, for some time, how to adapt these ores for cheap and rapid conversion into steel—a problem as yet unsolved. Of these vitiating elements, the chief is phosphorus, the presence of which hinders the use for steel-making of the cheap and plentiful ores to be found in Cleveland and other parts of the kingdom. The utilisation of these stores in the method indicated is a work now of time only, and its completion may form the commencement of a revolution in metallurgy

as complete as that following the discovery of the Bessemer process.

As by the latter the greater portion of our steel is now produced, it may not be uninteresting to glance at the process. It has been already stated that rich ores must be used, for the reason stated, and these are smelted in the blast furnace in the mode employed in the manufacture of pig-iron. But in the most economical and the quickest mode of steel manufacture,



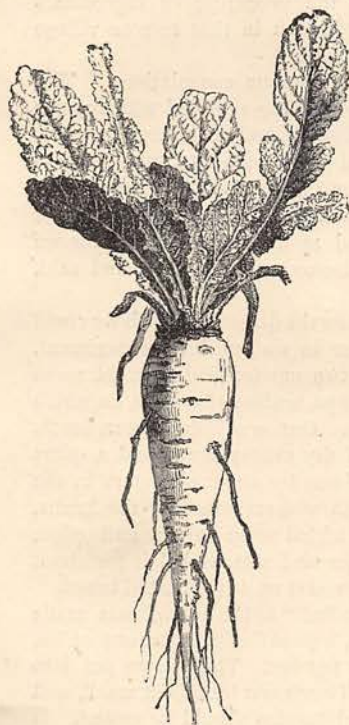
THE BESSEMER PROCESS.

instead of the molten iron being allowed to cool into the "pig," it is conveyed direct to the Bessemer converter, a hollow vessel, almost egg-shaped, mounted on an axis, and lined with fire-clay or ganister, and having its bottom fitted with fire-clay cylinders perforated with holes. Its work is to allow of the decarbonisation of the molten metal, and the after-addition of a determinate quantity of spiegeleisen or an equivalent. When the molten metal is poured into this hot converter, a fierce blast is turned on, and through the air-chamber at the bottom of the converter and the perforated cylinders, it pours through the hot metal, its pressure being, of course, more than the weight of the latter, otherwise the metal would, when the converter is placed upright, fall through the holes. As the vessel is placed upright, fierce flames leap from its mouth, growing brighter and longer, and bringing with them showers of sparks thrown upwards and outwards, and falling at some distance from the vessel. Minute after minute this spectacle continues—the glow and the flame increasing, and leaping out of the mouth of the

vessel in furious flames and crackling sparks; but at length the volume of flame lessens, and shortly the converter is partially turned on its axis, sending out a momentary stream. The decarbonised iron now receives a portion of "spiegel," or of ferro-manganese, which in mixing with it causes an ebullition, and the issue of a mass of flame, paler in tint and less furious in force than before, and with the addition of this the manufacture of Bessemer steel is complete. In a short time the converter pours its charge of from three to six tons into a ladle, and this is swung over a row of ingot moulds which form the arc of a circle. The ladle is tapped at the bottom, and a stream of pale-straw-coloured metal runs out into each mould in turn. When the metal acquires solidity, the moulds are raised from their still ruddy contents, and the great ingots are taken, yet hot, to be reheated in the furnaces, prior to being sent to the rolls to acquire the form of rails, or to be otherwise treated, according to their intended use.

Since, by processes such as this, the price of steel has been brought so low, and since the durability of the product of these processes has been fully demonstrated, there has been a revolution in the metallurgical world. Steel rails have, to a very large degree, supplanted those of iron; steel plates are beginning to be used for ship and boiler building, and in many other modes the cheap and more durable material is being increasingly used; while as its production is increased, the difference in price between it and iron is lessened, and its use continues to expand. The consequence of this is that the iron-producing districts feel very much more the force of the depression in trade than do the steel-producing districts; and there is in progress a very great change in the facilities of manufacture, for many of the iron-manufacturing firms are changing their works, and becoming Bessemer steel makers. When this change is accomplished "the iron age" will have given place to that of a purer and a longer-lived metal.

A SUMMER EXPERIMENT IN COOKERY.



WE were what landladies know as "a troublesome party." There were not many of us, but we were all independent people, who had formed our own habits and ways. One of us had been long in somewhat enfeebled health, accustomed to indulge in oysters and sweet-breads, in jellies and soups. Another of us had a constitutional inability to eat mutton. One was accustomed to early dinner, and another to late. And now here we were, settled down for a whole month in a little village three miles from any railway station, with one "shop" where every-

thing was sold, from boots to bread, and with one butcher, who supplied the rectory and the Great House, and sometimes killed an extra "beast," generally a sheep, which the village consumed at its leisure.

It was here, and at this dreadful juncture, that we became enlightened as to the meaning of that phrase "butcher's meat," which we had heard so constantly on the lips of the peasantry, and which had hitherto

struck us as mere tautology. We found that there is a "meat" which is not "butcher's." There is the domestic pig, which is either slaughtered in one's own sty, or bought in the form of bacon at "the shop." This was the village *pièce de résistance*. The first day that the butcher entirely failed us, our landlady mildly and timidly suggested "bacon." At the very sound of the word the delicate member of our party went to bed with a bad sick-headache, and stayed there for the remainder of the day.

"Can any fish be got?" we asked wildly.

"No," said our landlady hesitatingly—sometimes a man from the county-town brought over a basket of red-herrings, but he was not to be depended on. There was tinned-fish at the shop, but the village people "did not fancy it," and the stock was stale, seeing that the shopkeeper's own family would not touch it.

What could we do? We told our landlady that we would think about it, and would communicate the result to her, whereon she joyfully withdrew. And we sat and looked at each other.

"I've heard that it is possible to live very nicely without any meat at all," suggested our mutton-hater.

"I've heard of people doing so, and declaring they live the longer for it," said our late diner. "They'll give you a list of vegetable-eaters who have reached a hundred years. But I believe it is with them as with the early risers—they must have been very strong to dare to begin the habit at all."

"It could not hurt us for a little while," said our early diner.

"We might try it for one or two days," said all of us.

"We can't do better while we can get nothing else," said our late diner.

And so we set our wits to work. Our mutton-hater