"HONOUR TO WHOM HONOUR."

Nobody, we should imagine, will begrudge Sir Henry Bessemer the distinguished honour of Knighthood which Her Majesty the Queen has been graciously pleased to confer upon him—an honour which was undoubtedly his due by reason of his great services in partly originating and thoroughly developing an entirely new branch of our iron and steel industry. This recognition has been somewhat tardy, coming as it does at least twenty years after Mr. Bessemer's eminent talents had received honorary distinction from the rulers of other countries, who were sharp enough to see and generous enough to reward, in some shape, the services of a man whose position not only entitled him to rank among great inventors, but whose discoveries have so enormously benefited mankind. Other men may have thought in the same groove, and cudgelled their brains in the hope of improving modern metallurgy in some such way as Henry Bessemer, without either making money or winning honours, and if he—an inventor from his earliest years—alone and unaided, walking the path that was open to him in the wide field of scientific discovery, achieved a splendid success, surely the more honour to him. Who can say that, if Mr. Bessemer had been effectually discouraged by the enormous difficulties which surrounded his tentative experiments, any other man was certain of success?

Let it not be forgotten that the methods for producing steel now universally known as the "Bessemer process" were originally received with incredulity and derision. Mr. Bessemer's discoveries, although based on principles well known to scientific men, were on their first announcement held to be wholly untrustworthy by practical iron manufacturers, who were acquainted with malleable iron only as a solid substance, which the highest heat of their most powerful furnaces merely sufficed to render sufficiently soft to yield to the blows of the hammer; and for this reason the proposal to convert molten pig iron into fluid malleable iron, in a few minutes, and without the consumption of additional fuel, was considered an absolutely impossible feat. To the genius and unwearied perseverence of Mr. Bessemer we owe the combinations of chemistry and mechanics which, long after they had overcome the obstacles of nature, obtained a slower and more difficult victory over the prejudices of habit and ignorance. Our metallurgical pioneer was indebted to no one for his facts—they were the common property of every practical ironmaster; and after all his conclusions were abundantly verified by his own experiments. Previous to his discoveries being made public, many of the facts which he made the foundation of his invention were deemed of no importance. Any one who has watched the process of forged horse-shoe nail-making in any of the little Staffordshire smithies, will have noticed a small pair of bellows in front of the workman's block used for forcing a blast of air upon the heated rod of iron that is being hammered on the anvil. This illustrates one of Mr. Bessemer's facts. He was the first to show that if air was forced, not upon the surface merely, but into and amongst the particles of molten iron, the same sort of combustion took place; and the heat obtained in this way is more intense than any that had been used previously, either in the blast furnace or the process of puddling. We need not trace the connection between this application of air to molten iron and the process of decarburisation which it brings about, or refer more particularly to the combinations which take place in the puddling furnace between the oxides of iron and the carbon at high temperatures, or of Mr. Bessemer's patent process of removing the carbon from the iron by the act of burning it with oxygen at a high temperature. It is in this patent, however, that we find reference made to the appliances specified in previous patents, and taken in combination, there is a complete embodiment of the essential elements of Mr. Bessemer's invention.

This faintly indicates the character of our great inventor's investigations, in the course of which he has expended not only many years of labour, but large sums of money upon the apparatus needed for them. We prefer to deal with results. Sir Henry Bessemer has increased the national wealth enormously by his process of converting crude iron into steel, thus giving employment to thousands of workmen, and putting in motion wheels in industrial production that would otherwise be at rest. In the matter of railway material it is estimated that the substitution of Bessemer steel for iron will produce a saving of expenditure during the life of one set of steel rails on all the existing lines of the United Kingdom of more than one hundred and seventy millions sterling. The great growth of the steel trade is undoubtedly due to the man whose name will ever be indelibly associated with the history of English metallurgy. Prior to his invention, the entire production of cast steel in Great Britain was only about 50,000 tons annually, and its average price from £50 to £60 per ton. In the year 1877, notwithstanding the depression of trade, the Bessemer steel produced in Great Britain alone amounted to 750,600 tons, while the selling price averaged only £10 per ton, and the coal consumed in producing it was less by 3,500,000 tons than would have been required in order to make the same quantity of steel by the old, or Sheffield, process. The total reduction of cost is equal to about £30,000,000 sterling upon the quantity manufactured in England during the year. During the same year the Bessemer steel manufactured in the United States, Belgium, Germany, France, and Sweden raised the total output to 1,874,278 tons, with a net selling value of about £20,000,000 sterling.

It is not to be wondered at that under the circumstances the term "Bessemer metal" has become current in most of the languages of civilised communities. Sir Henry Bessemer may be proud of the honorary distinctions showered upon him, but he has added to his courtesy titles the more substantial rewards of a successful inventor in the commercial appreciation of his discoveries. Few inventors have made money so rapidly and continuously, and none perhaps have had less reason to complain of the hardships of our anomalous patent laws than Sir Henry Bessemer, for he quaintly acknowledges the receipt of royalties amounting "to no less than 1,057,748 of the beautiful little gold medals which are issued by the Royal Mint with the benign features of her Most Gracious Majesty duly stamped upon them." Is there no hope for the poor inventor?—*Martineau & Smith's Hardware Trade Journal.*

Mechanical.

MOLDS AND CORES FOR CASTING STEEL.

Steel made by the open hearth furnace comes therefrom very much hotter than when melted by any other known process; Mr. George Cowing, of Cleveland, Ohio, has, therefore, been induced to invent an improved mode of casting. It is on account of this intense heat of the molten steel that difficulties have arisen in casting, as the contact of the steel with the walls of the mold fuses the material of the mold and forms a flux or scoria that coats the casting and is difficult to remove. This effect takes place with all materials that have been heretofore used for molds. Common sand, plumbago, charcoal, coke, and other materials have been tried, but the foreign matters contained in these substances are of such a nature that the successful prevention of flux or scoria has not been heretofore accomplished. The object of his invention is to construct a mold from a substance that is adapted for ordinary use as molding material and possesses refractory qualities sufficient to successfully resist the tendency to flux when brought in contact with the hottest molten steel. According to his invention, silica is used in the construction of molds for this purpose, as it has been discovered that pure silica, with suitable binding material, answers the requirements set forth, and that by its use, steel castings may be produced almost or entirely free from the flux or scoria. In proportion as the silica used for molds contains limestone, feldspar, mica, or other silicates, oxide of iron, or foreign matters of any kind, the castings will be coated as described, and sand, such as is used for molds, contains silica more or less mingled with the substances named.

This fact, without doubt, explains the reason why it has been heretofore considered impracticable to use sand molds or molds made from powdered stone, old clay pots, or like material for casting steel from an open hearth furnace. In carrying out this invention it is preferred to obtain the silica from rock crystal, white pebbles, or white sand; if white pebbles are used they should first be pulverized and thoroughly freed from oxide of iron or other foreign matters. When about to be formed into molds the silica is to be mixed with any appropriate binding material, such as molasses, sour beer, flour, or other glutinous substance, silicate of alumina, or the like, care being taken to employ no substance containing any metallic oxide, or anything that might flux. A sufficient quantity of the binding material will be mixed with the pulverized silica to form a plastic mass that can be molded, and will retain its shape after molding. An additional advantage obtained by the application of this invention is the ability to cast mild steel—*i. e.*, steel having a low percentage of carbon, which cannot be done in molds consisting of or containing plumbago, graphite, coke, or other forms of carbon without subsequent annealing. As stated before, he is aware that materials containing more or less silica have been