

# WORKERS AND THEIR WORK.

## THE BLACK COUNTRY OF SCOTLAND.

BY JOHN FOSTER FRASER.

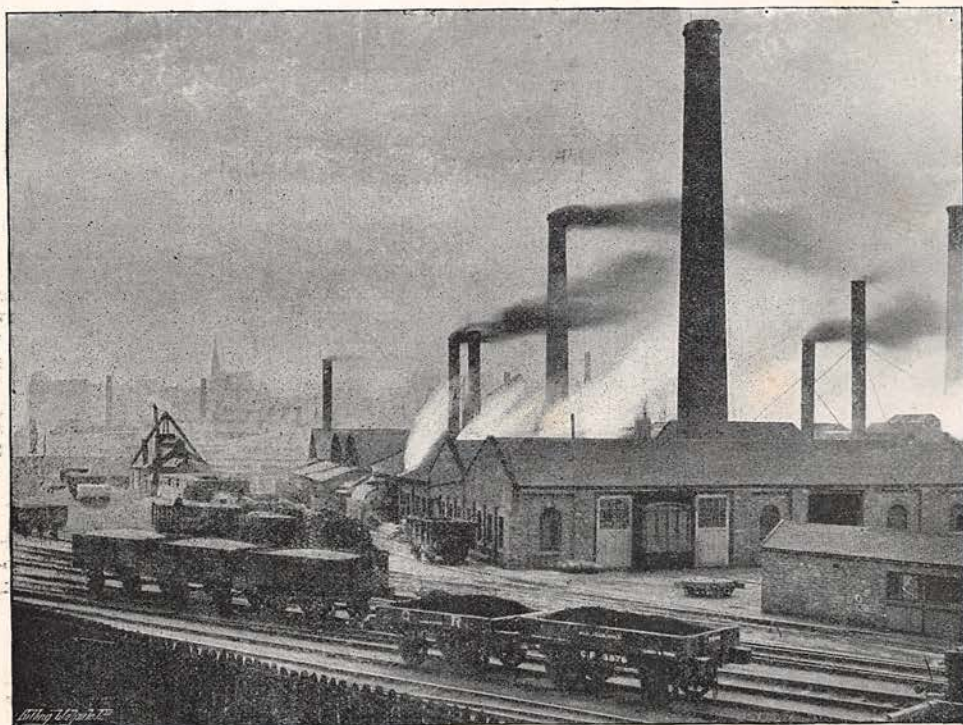
*Illustrated from photographs by C. REID, Wishaw.*



SCOTLAND has other things to show besides frowning crags, rushing torrents, and bare-kneed Highlanders. The Sassenach and his cousin the freeborn American look upon the Land o' Cakes as famous in a material

twelvemonth. There is now no stain and consequently pieces of the woodwork are not purloined and taken in triumph across the Atlantic.

But when I was in Scotland a little time ago I carefully avoided the tourist track and visited a part of the country which the foot



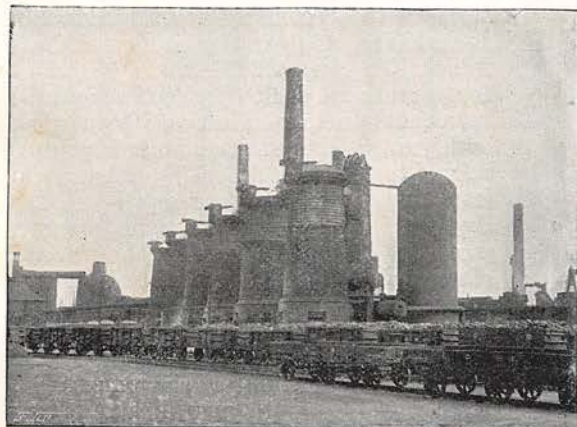
COATBRIDGE.

*(The centre of the Scotch Black Country.)*

sense for its whisky and its historical relics. The Americans must have relics and as many are forthcoming as are needed. The Scots are ready to oblige. Not only must the staircase on which the Italian wooer of Mary—Rizzio—be shown in Holyrood Palace, but the stain of his blood must be produced. The attendants considerably provided a new stain every year the visiting season came round. They did not mind a sixpenny pot of stain now and again, but they drew the line at having to put in a new floor every

of the traveller, save he be a commercial traveller, rarely treads. I went into Lanarkshire, the country of coal mines and iron works. It is the Black Country of Scotland, where the air is sulphur-laden and the hills can only be seen in the far distance through a smoky haze. There is nothing to indicate one is across the romantic border except the poetical drone of the natives and the solid-built graystone cottages. While most of the iron is made in Lanarkshire it is in Glasgow that it is sold. Glasgow is like other sea-

ports, bustling and business-like, and is as miserable as Manchester when it rains, which is by no means unfrequently. One is sur-



A ROW OF FURNACES.

prised to find that the meaning of the word Glasgow is "a beloved green place."

I spent a morning in the Glasgow Exchange, where dealing in pig-iron is carried on. I was particularly interested in the famous "iron ring," the members of which have a special corner of the hall reserved to themselves, and there they sit in a circle or crowd round the chairs while speculation goes on. This "ring" has about a hundred members, representing some sixty or seventy firms. But in addition to representatives of firms there are members of the "ring" who are simply brokers or dealers. The iron broker may never have shipped or supplied a ton of iron to a consumer in his life, consequently he does not as a rule bother his brains about technicalities, process of production, and the wants and requirements of the founder, malleable-iron maker and steel producer. He exercises all his energies in operating on

the market and to make what he can out of his "deals." But before going into the mysterious working of the inner circle let me explain what a warrant is. A Scotch warrant is a piece of paper representing 500 tons of what is technically called G.M.B. (Good Merchantable Brand) pig-iron. The iron is given in the charge of store-keepers, who issue the warrants, which are therefore very much in the nature of a bank-note. Warrants are a negotiable security, and it is with these documents that very extensive dealings take place in the "iron ring." They may change hands scores of times, nobody ever seeing the iron but knowing it is easy to be got at.

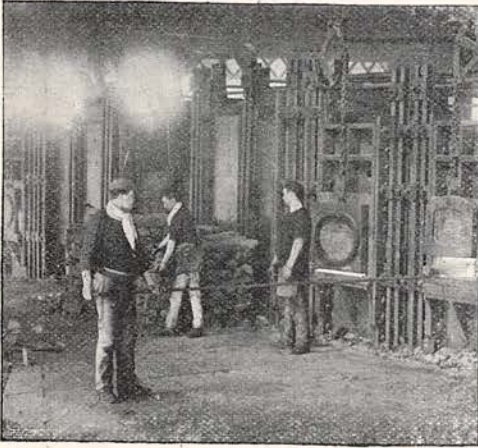
A volume might be written on the proceedings of the "ring." It is of course abused, and many a man has had a nasty commercial tumble through speculating rashly with the warrants. One man I talked to spoke most vehemently against this clique of merchants and brokers for having frequently created a scare and at times brought about undue depression, while at other times it has raised prices to unnatural levels to the hurt of the consumer.



CHARGING WITH COAL AND ORE ON THE TOP OF A FURNACE.

Still, speaking generally, I think it may be taken, notwithstanding the "bulls" and the "bears," that the warrant market as a whole reflects the true position of the trade. For

the benefit of those not familiar with Stock Exchange phraseology I may define what is meant by "bulls" and "bears," so frequently referred to in connection with dealings in



CHARGING A FURNACE.

warrants. The "bull" is a man who buys and holds for a rise in price, and of course does his level best to induce a rise, whilst the "bear" sells as a rule for forward delivery, in the hope that ere his sale matures the market will fall and so reap a profit. The "bear" is an animal not in much favour for his occupation has been well described as "selling what he has not got to somebody who does not require it." He is a lover of bad news and when prices are depressed then he is in his glory.

The iron-producing materials in Scotland are obtained within a comparatively small area, indeed within and bordering on the valleys of the Clyde and Forth. Lanarkshire comes first, and most of the great blast furnaces which light up the land at night with their great beacons of flame are in this county. The computation has been made that in Lanarkshire alone there are two thousand million tons of coal yet to be claimed, so there is no immediate prospect of the coal-beds being exhausted.

Before I proceed to describe my visits to some of the largest iron works in Scotland I may be pardoned for assuming the ignorance of the reader and point out there are nineteen kinds of iron ore. But quite nine-tenths of the iron made is derived from two kinds, the clay-band and

the black-band iron stones. The ore consists of iron oxygen and earthy matter, and the object of the smelter is to separate the two latter from the former. Quite two-thirds of the Scotch pig-iron is produced in Lanarkshire, chiefly in the vicinity of Coatbridge, Glasgow and Wishaw. Coatbridge is the centre, a dour, dismal place, and the surrounding country is lean and bedraggled, with great patches of ground on which grass refused to flourish. All the blemishes of an iron district are laid open to view in the daytime. It is therefore towards evening, when dusk falls, and you look through the gloom and distinguish half a hundred blast furnaces licking the air with their fiery tongues, when the shadows are lurid and fierce and dance among the low hanging clouds, that you get a truly picturesque view. I witnessed this sight one night. It was weird and fascinating. The men working in the glare thrown forth by molten metal were like spirits in the nether regions. And this recalls some lines of Burns, written when he was refused admittance to the famous works at Carron—

We cam' na here to view your warks  
 In hopes to be mair wise,  
 But only, lest we gang to hell,  
 It may be na surprise.  
 But when we tirl'd at your door,  
 Your porter dought na hear us;  
 Sae may, should we to hell's yetts come,  
 Your Billy Satan sair us.

The first works I visited were situated in the very heart of the iron districts. A long row of furnaces stand out boldly and challenge the attention of the pedestrian. Trains were being shunted, and I had to keep my eyes well open to avoid the snorting engines which were running hither and thither.



BOYS MAKING PIG BEDS.

First of all I inspected the piles of ore, deposited from the trains in massive bins. There was considerable difference in colour. English ore had a warm reddish tinge whilst that from foreign countries was dull brown. The best ore, which goes towards the making of hematite for steel, is brought from England, France and Spain—chiefly Spain; but for ordinary pig-iron the home ore is used. Iron ore usually contains about 50 per cent. of iron. Various qualities are mixed; then it is weighed in trucks, wheeled to a hydraulic lift running up by the side of a furnace, and carried to the top. I went to the summit of a furnace and was consequently nearly blinded with the smoke and the fumes. There is an immense appliance called a "bell," something like the top of a candle-snuffer placed inside a cup. Wreaths of smoke escaped from where the two joined.

A mixture of coal and iron ore and some limestone was arranged around the bell. Then a man, hid behind an iron screen and working a lever, lowered the bell arrangement. Immediately the flames jumped out, but at the same time the coal and the ore disappeared into the caldron of fire below. There was a great outburst of coal-gas fume which caught one's breath. It was decidedly unpleasant. Hanging over the furnace top was a swinging fire, the size of a bucket, intended to burn up the fumes as they escaped. Otherwise life in the iron yard, and indeed the surrounding country, would be hardly bearable.

The coal emptied into the furnace has two functions to perform. It raises the ore to a high temperature and carries away the oxygen, and the lime plays the part of a flux

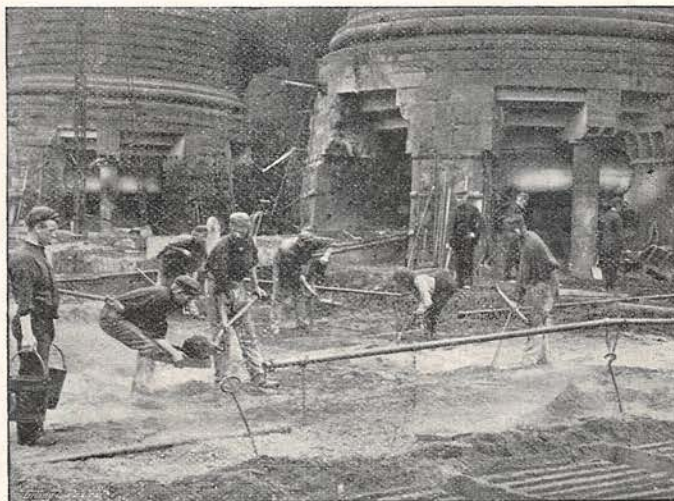


FILLING PIG BEDS.

on the earthy matter. The iron being the heaviest gradually percolates to the bottom of the furnace in a molten state, whilst the slag floats on the surface of the iron. It takes two days for iron, after being put in a furnace, to find its way to the bottom.

In order to get the iron to a high temperature

blasts of hot air are forced into the furnace. Massive engines compress and drive the air into the furnaces, and on its journey it goes through stores filled with a checker work of fire-brick which has previously been heated to a bright red by means of escaping gases conveyed from the top of the furnaces through a tube. The heated air from the stores passes into a large cylinder lined with a thick wall of fire-brick and is carried along to each furnace, and is then driven through what are known as tuyeres right into the incandescent fuel. There is a continuous



MOULD MAKING.

stream of water running over the tuyeres to prevent them melting.

The melting point of iron is 2400 degrees, and when it attains this heat it is ready to

be run into the "pigs." In front of each furnace is a bed of sand, gently sloping, in which wooden moulds, the size of a bar of iron, are impressed. Several hundreds of these are made with channels formed down the side and along the top by means of which the metal can journey. The design looks much like a gigantic gridiron. A groove is made in the sand from the mouth of the furnace to what are technically called the pigs, the indentation along the top, and out of which the pigs are fed, being termed the sow. It is a fine sight when the signal is given to see a liquid fiery band stream forth

jagged and uneven. As soon as iron is sufficiently cool—and this will be the morning after it is run into the pigs—it is thrown into the railway waggons which run close by and are ready to be sent to their destination.

It is understood of course that all the pig-iron is to be melted again to be made into malleable iron or steel. Only a few works have blast furnaces of their own. These furnaces are never put out, year after year, except in the case of a dispute between the employers and the men, and when there is nobody to keep them going. As a rule



IN THE DRESSING-YARD.

from the furnace and rush spluttering along the channel filling up each row of pigs. The glare and the heat is stronger than that of an African sun as the iron rushes and gurgles and a thousand momentary sparks fill the air. As pig after pig is filled a boy stands by and shovels sand over the bed of floating iron. While the bars are still red and glowing, men in wooden sabots walk over them. While one man with a lever forces up the sow another swings a hammer and separates the pig into bars. Thus if you happen to see a bar of pig-iron you will notice that while one end is rounded and even the other end is

malleable iron and steel works buy their pig ready made.

A visit to an ingot mould foundry I found instructive. Here the huge moulds into which the makers of steel pour the metal were made. In a moulding shop were a number of men working designs in a composite clay. At one end of the shop was the steel melting furnace where the metal was being converted in a molten state. When ready this metal is poured into a massive ladle, carried by an overhead travelling crane to any part of the shop, and is then poured into the moulds. There is

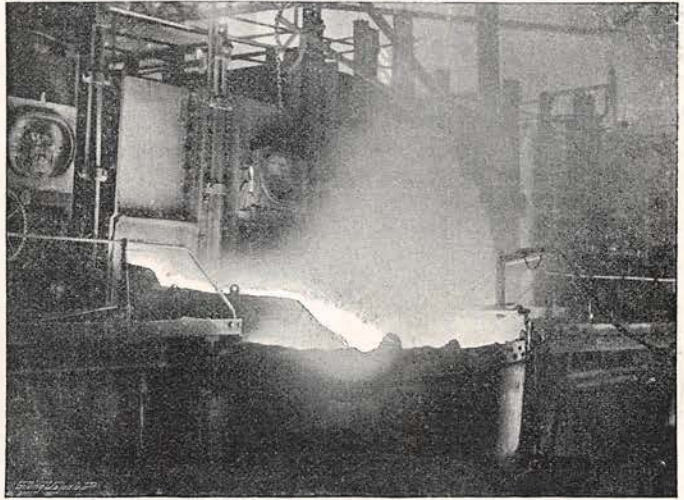
always a surplus head to the casting and this has to be cut off by machinery. A wheel after it is taken from the casting does not look very attractive for all the edges are rough and unequal. Before being dressed to get rid of the various excrescences the castings are put in a large store. By the agency of gas they are brought to a white heat. The castings remain in the store three or four days cooling slowly, and by this means the metal is rendered tough.

One can well appreciate the importance there should be no flaw in the casting, and that its constituent parts should be of such material as not to suddenly give way and cause an accident. Therefore every wheel is practically tested by a Government inspector. This is done by a bar being cast on the side of every wheel. The inspector affixes his stamp to this bar. It is then cut off and sent to be tested. As it stands the test so it is naturally assumed that the wheel from which it has been cut will also stand the test.

In the dressing-yard was a deafening noise. There was the clatter of a hundred hammers and chisels making the wheels even, cutting off pieces that were unnecessary and generally trimming them up ere they were forwarded to the various railway companies for which they were made. Slog, slog, sounded the hammers on the metal, and above it all was the screech of a saw cutting bars of iron in twain.

It might be thought that an ironworks is a place where iron is made. So it is, but other things are also made. Competition is very keen, and it is by the using up of what would otherwise be waste that a profit is really secured. From the burning coal in the furnaces there rises a gas. In former days this gas was allowed to escape; now it is arrested. By suction tubes it is drawn away at a temperature of 400 degrees. There is a good deal of dust and this falls to the bottom of one of the tubes and at intervals a door is opened for men to clear it out. For a long way the gas travels through pipes to atmospheric condensers, a range of great pipes running up and running down like the

pipes of an organ. There are 448 of these pipes and each is 50 ft. high with a diameter of 20 inches. By the time the gas reaches the pipes its temperature has been reduced



TAPPING THE MOLTEN METAL.

to 186 degrees, and as it travels up and down them—water is always being played on the pipes—it is reduced to between 70 and 80 degrees.

And what happens next? Why, the gas is deprived of its water and tar, the water is pumped into an overhead tank, the gas is washed in a strong chemical liquor and the tar comes floating out into great basins. The gas is washed several times, all the water as it is extracted being pumped into the tank. After the third washing the gas is sent on to generate steam which drives the various engines on the works. Not a ton of coal is used, but all the refuse gas goes for this purpose. It is an immense saving. All the gas cannot be utilised, and from fifteen to twenty million feet is allowed to escape in flame, for if it were not ignited the obnoxious fumes would stink the whole country side. The tar passes through other machinery, and there is extracted from it creosote oil used for railway sleepers and for lighting those lamps we see used at night when roadways are being repaired.

But what of the water which has been pumped into the circular tanks? It is driven through sulphuric acid with the result that it deposits sulphate of ammonia used for manure.

Thus there is no waste. After the iron

has been made the remaining gas not only drives all the machinery on the plant but it is turned into tar and manure. If there is any waste it is the slag that floats on the top of the molten iron in the furnaces. What to do with this has long been a problem. It is poured out in a liquid state in trucks and is heaped in mounds. These mounds are the size of hills. All over the country you see them reared as high as St. Paul's and covering acres of ground. The gray slabs are an eyesore and only encumber and disfigure the earth. Various experiments have been made to turn the slag to use. One or two ingenious manufacturers have made ornaments out of them, and an endeavour is now on foot to convert them into bricks. Anything would be better than the slag to be pitched away as useless and covering ground that might be put to a better purpose. Even were a means discovered to convert the slabs into railway sandwiches the makers of pig-iron would hail the discovery as a boon and a blessing to themselves, if not to other men.

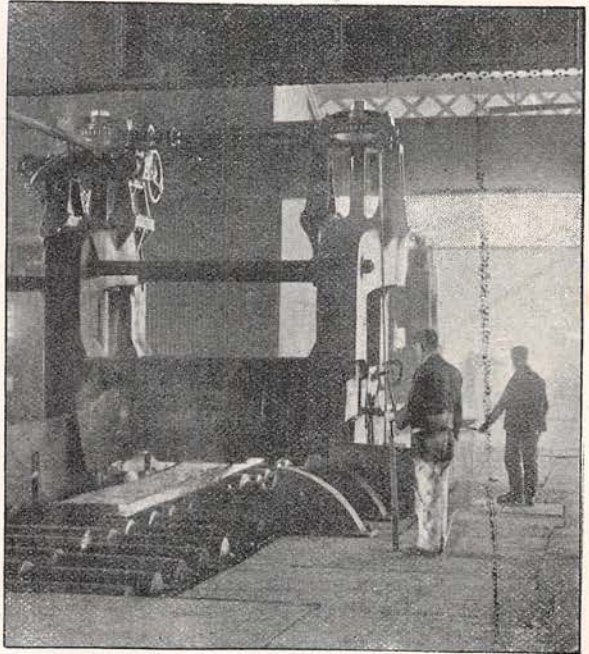
The one fact which struck me, apart from this vexed question of the slag, was the economy observed in the making of pig-iron. The splendid machinery, the scientific appliances, the skill and the forethought to make nature give up all that she had for the benefit of man were such as to make an ordinary being like myself marvel.

But if a visit to blast furnaces was interesting, doubly so was a tour over the steel works of the Summerlee and Mossend Company. Here again I saw how completely the forces of nature had been subjected to the use of man. There was much that was complicated, much that was confusing to the lay mind, but on every side was evidence of marvellous ingenuity. The hydraulic pump which pumps all the water used on the Mossend plant was working like a giant and groaning at every stroke with the ardour of its labour. No wonder, for the pressure was 700 lbs. to the square inch.

There are few sights more fascinating than to see a great caldron of molten metal seething and heaving and casting off beautiful blue tinted gases. I walked the range of the furnaces under the guidance of Mr. G. T. Neilson, who is a descendant of the inventor of the famous hot blast in the making

of iron. It was natural so wonderful an invention should be patented. It was so excellent a plan that other ironmasters coveted it and actually infringed the patent. One company had to face a court of law on the point, with the result they were obliged to hand over a cheque for £150,000 as compensation. Mr. G. T. Neilson explained the various processes, and I was fortunate in visiting the works at a time when I could see the making of steel in every stage.

When I arrived the men were just tapping a furnace in which thirty tons of steel was floating. The steel is made of pig-iron and steel scrap oxidised with Spanish ore. At

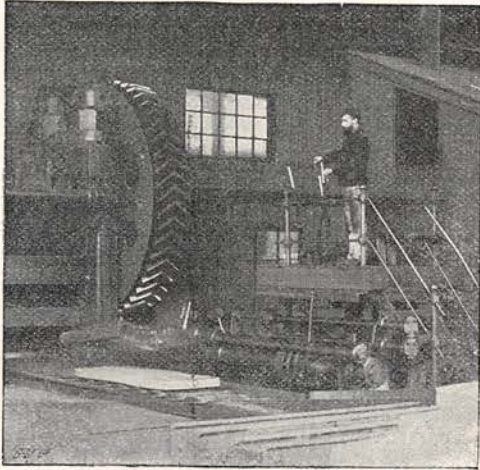


COGGING MILL.

the back of the furnace where the tapping took place the mass of metal was poured into a huge ladle which a steam travelling crane traversed over the moulds placed in a trench running the length of the furnaces. The men worked close to the spluttering metal, quite unheeding any danger they ran. It was hot work. Their trousers were tightly strapped about them; the arms of their woollen shirts were rolled up and their breasts bare. There was a thin cloud of hot dust in the atmosphere and this, settling upon their perspiring skins, made them grimy and strange looking. When the glare of the fire beat upon their sweat-stained visages they presented a striking picture.

They did not heed the sparks which struck them.

As the steel gurgles from the ladle into the ingot mould one notices its bright and golden colour. When the mould is full sand



THE GUILLOTINE SHEARS.

is shovelled on the top, a steel lid is placed above this and then tightly and securely fastened down, and this materially assists in solidifying the metal. Then the ladle is traversed over another mould and the same thing done again. All at once it is remarked that the metal has become darker in tint. This signifies that all the steel has run out and that the slag which floated on the top has been reached. It is immediately shut off and the slag is run off into a large circular box called a slag box, and is subsequently trucked off when cold to one of the interminable heaps of slag disfiguring the country side.

When all the metal has been poured out of a furnace the bottom is repaired. Then it has to be loaded. The oven is still oppressively hot, and in loading it with pig-iron a long shovel, called a "peel," something like that used by a baker, is brought into requisition. Cars containing a load of pig-iron broken into convenient sizes are run up to the side of the furnace. On the end of the shovel pieces of pig are placed, and a man stows them all round the interior of the furnace. When the steel scrap has been added the furnace is ready for firing.

The heat is produced by the combustion of air and gas. Underneath the furnace are four chambers, two for gas and two for air. These are driven alternately into the furnace and a tremendous temperature is obtained,

until the bars of iron melt like bars of lead. It is impossible to look into a furnace, when it is all aglow, with the naked eye. The brilliancy is too dazzling. But through a pair of dark-blue tinted glasses one can see the metal positively boiling. These glasses are a rest and a relief to the eye when looking through the door of a furnace, but all the time there is a feeling that one's cheeks are being basted. It is difficult to conceive the immense heat near these furnaces. As the men are in constant perspiration it struck me the effect would ultimately be to make them very thin. But Mr. Neilson assured me to the contrary; and truly, judging from the men I saw, the result of being always in a high temperature is to make them wax fat.

I have said that the moment steel touches anything it hardens and the surface cools. This applies of course to the metal when it is run into the moulds. Taken from the moulds the steel is in great blocks called ingots, about 6 feet long by 3 feet wide by 2 feet thick. They are to be

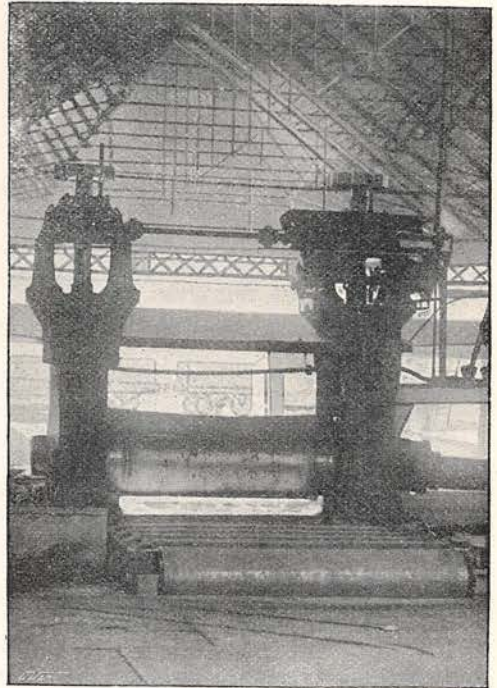


PLATE ROLLING MILL.

rolled, but this cannot be done at once, for although the outer case of the steel is hardened the inner part is, and remains for some time, in a liquid state, so that the only result of rolling would be that it would



squirt like an orange trod upon. Therefore the ingot has first of all to become consolidated throughout. This is done by reheating to a white heat in an underground furnace.

A pair of great claws on the chain of a travelling crane grip one of these gigantic ingots and goes grunting with it across the works, the ingot swinging in the air, a mass of white hot metal. The heat it sends forth is so great that no man can get within some distance of it. Therefore all the moving about till it becomes cooler has to be done by hydraulic machinery. It is lowered on to a series of rollers over which it runs to the cogging mill. It is worked forward and backward through this mill, and every time the pressure imposed is greater, and the slab begins to lengthen out. The rolling, while it lengthens a piece of steel, never widens it. But the ingot is turned on its edge to be made square, and the turning is done by a "tilter," a clever arrangement of levers worked by hydraulic power, which simply grip it and place it on edge to go through the rolls again. I stood for fully half an hour watching

this rolling, the whole machinery of which was worked by two men and a boy. Backwards and forwards, backwards and forwards was the steel rolled until its warm white glow gave way to a red, through which however the white hot steel might easily be seen, and its length had been extended thrice what it was originally.

Having rolled the steel to the required length the ingot is worked on to another set of rollers where a heavy guillotine knife cut it into rectangular pieces called slabs. These slabs run up an incline, and quicker than I take to write it they were shunted on to a trolley which a small engine hurried off with to the plate mills for the steel to be heated and rolled again. The great business of the Mossend works of this firm is to make steel plates for the building of vessels,

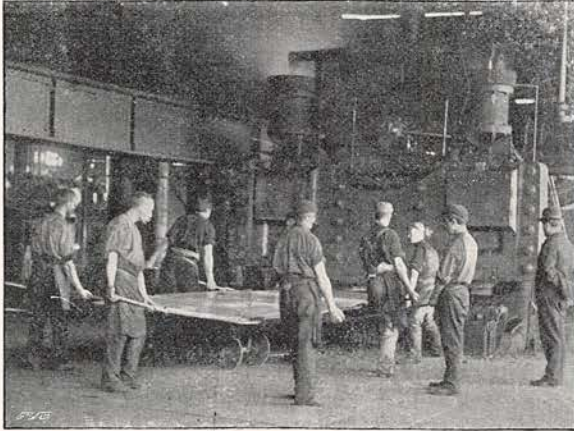
boilers and bridges. But by this time the steel if not cold had at least lost much of its vigorous glow, and once more each piece had to be put in a furnace till it again attained a white heat. The moment it is drawn from the furnace, which is done by hydraulic power, as also is the charging of the slab, it is placed on a truck and off goes a snorting engine with it to the rolling mills.

What a deafening din there is always in these mills! There is the pulsing of the engines and the throb of the machinery. The atmosphere is heavy and dust laden. There is the clang and the crash of steel plates violently thrown on the floor, the beat of hammers and a hundred other noises which made my ears ache. The men were almost stript to the waist, and as I saw the hard muscles rise on their arms as they swung

the plates of steel into their place ready to be trimmed, and saw black impressive machinery, and gasped at the iron dust which got into my throat, I could not help contrasting these modern sons of Scotland with their forefathers, when iron-bound ships were unthought of, when life was spent among the hills with the cattle and the only

thoroughly appreciated diversion was a raid over the border and a skirmish with another clan. But the skirmishes are now outside the dram shops, and the appreciated diversion is a music hall.

But the modern Scot does his work well; his industry has passed into a proverb. Again and again is the slab rolled and every time it gets thinner until it is 20 or 30 feet in length. The rolling ceases when the exact thickness is obtained. All the time rolling is in progress water is being thrown on the slab and this clears off the scale which always accumulates. Then is the steel plate moved on to the other pair of rolls to be finished. So nicely adjusted is the machinery and so competent are the men that they can get within one sixty-fourth of an inch



A SHEARING MACHINE.