

Science and Art.

The New Process of Manufacturing Iron.

In the three preceding numbers of this volume, we have described the new process for producing a very improved character of iron from common crude pig iron, by submitting the latter, while in a molten state, to the action of air or steam under pressure. This invention has been claimed by and for Henry Bessemer, of London; he read a paper on the subject before the late meeting of the British Association in England; has secured a patent for it, and the British Press generally has accorded him the entire praise and credit of the discovery. In our last number we stated that Bessemer was not the inventor of the process, but J. G. Martien, of Newark, N. J., who secured a patent for it in England three months prior to the date of Bessemer's, and we will now proceed to present more important information relating to it.

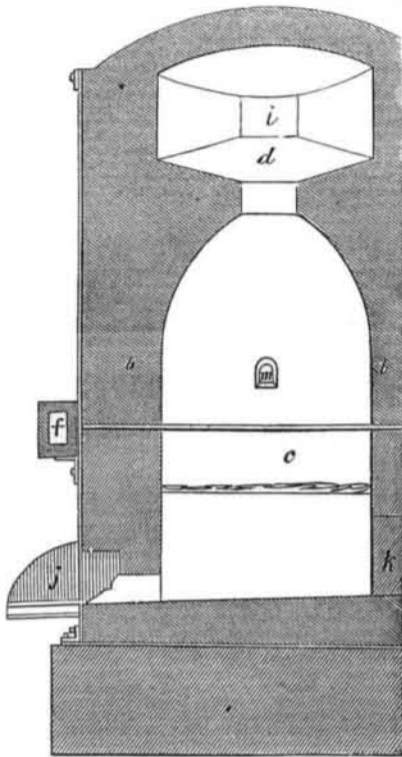
Figures 1 and 2 of the accompanying engravings are vertical sections, in elevation, of Bessemer's Furnace, copied from the *London Illustrated News* of the 6th inst.; *a* is the plate metal casing of the apparatus or cylindrical vessel in which the blast is made to operate on the molten pig iron, to purify and convert it into malleable iron or steel; *b* is the internal lining of fire brick; *c* is the lower chamber containing the fluid iron. *d* is an upper chamber for remelting scrap iron; *f* is an annular air passage communicating with the tuyere pipes, *g*. *h* is the main blast pipe leading to the blowing engine; *i* is an opening for the escape of flame, gaseous products and slag, when the metal is boiling; *j* is the tapping hole for the discharge of the metal when it is refined or purified. *k* is a man-hole for cleaning out and repairing the interior of the chamber; *m* (fig. 1) is the opening through which the molten crude iron is run in from the smelting furnace to the refining chamber, *c*. *n* is a fire-clay tuyere. Several tuyeres are fitted in, at separate distances apart, around the bottom of the chamber, and the arrows represent the blast of air passing through the hot molten metal, and up through one of the escape openings, *i*. The two succeeding figures, 3 and 4, represent the apparatus for refining the metal taken from his patent sealed on the 7th June last. These figures represent a molder's large ladle,—one of an egg shape. *a* (fig. 3) is an outer casing of plate iron; *b* is an internal lining of fire-clay. *c* is a supporting iron frame; *f* is a perforated fire-tile cover laid loosely over the mouth of the vessel, to allow the impurities and flame to pass out; and also to form a support to the air or blast pipe, *g*.

This figure being a vertical section does not show the axis, nor the usual handles or levers on each side for carrying and pouring out the metal. Fig. 4 is another form of a kindred ladle; its case is plate metal, *h*, lined with fire-clay; *j* is its supporting frame, and *k* is the handle for carrying it and tipping it to pour out the metal when refined; it has a conducting spout opening to receive the molten metal passing from the smelting furnace down the conducting tube, *r*. *l* is the opening to allow the slag and gases to flow out. When a charge of molten iron was run into the vessel (fig. 3,) the cover was put on, the pipe, *g*, inserted, and the air blast applied as shown.

Respecting fig. 4, the specification says:—"This vessel should be placed near the discharge hole of the blast furnace, and at such a level that the fluid iron may be run direct into it. The vessel should be of such dimensions as to be nearly filled with a single charge from the furnace. As soon as the iron is let in, I pass a pipe through the spout, into the vessel, and allow the end to dip into the metal. A current of atmospheric air, or both air and steam mixed together, is then to be forced into the metal and allowed to bubble up through it. I prefer to use hot blast, and that the air should be heated as high as practicable; or cold air may be used, it desired; in either case it will be found that the oxygen will thus be introduced into the metal and will rapidly combine with and carry off a large portion of the carbon and the impurities.

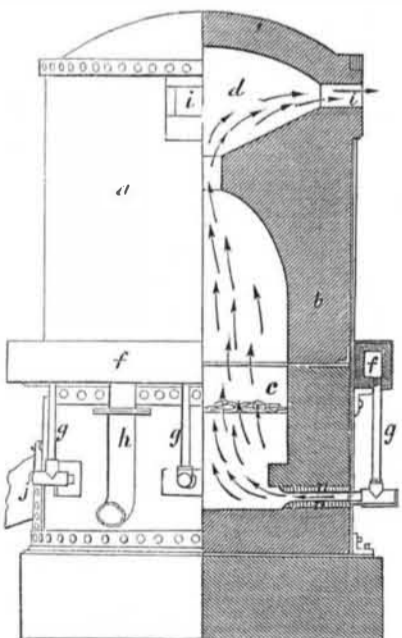
When the workman judges the process has been carried far enough (which the lessened fluidity of the iron will indicate,) he will turn the vessel on its axis and discharge the contents of it into a suitable mold, having compartments of such dimensions as will form ingots suitable for the puddling process."

Fig. 1.



The process, no doubt, embraces a great improvement in the manufacture of iron, and the nature of that process is, distinctly, the forcing of jets of air or steam and air combined, through molten pig metal, after it is run from the smelting furnace; the air or steam performing the office of refining the metal by carrying off its impurities—this is the invention. Who is the inventor of this process? We say, J. G. Martien, of Newark, N. J. He obtained a patent for it in England before Bessemer obtained his,—the one from which we quote, and from whose sheet of drawings figs. 3 and 4 are taken. To prevent any mistake respecting who was the first inventor, let it be remembered, that the above is taken from his full and perfect specification of the 7th of June last; he cannot go beyond that, and at that time he describes it as a preparatory process for refining iron for puddling. Let us now turn to J. G. Martien's process, patented 11th Sept., 1855, specified and sealed in London March 11th, 1856—three months before Bessemer's. The specification says, "I pre-

Fig. 2.



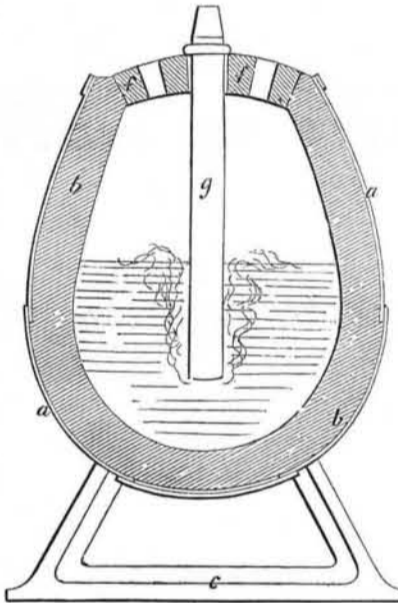
fer, in carrying out my invention, that the ordinary process of refining iron by the use of a refinery furnace, should be dispensed with, and that the purifying of the iron should be accomplished, by subjecting the melted iron from a blast furnace, before it is allowed to congeal, to the action of streams of air, or of steam, passed up through and amongst the melted metal." This proves conclusively that Mr. Martien is a prior inventor to Mr. Besse-

mer; and he claimed the process, not a specific apparatus, although he describes how the process can be conducted by an apparatus (as is required by law,) but does not claim the specific apparatus. In short, it appears to us that Mr. Bessemer's patent is nothing more than an extended description of J. G. Martien's, to whose invention he never alluded in his paper read before the British Association, although he must have been well aware of its existence.

We claim this invention as that of an American citizen, and we have proven it to be such from copies of the patents in our possession.

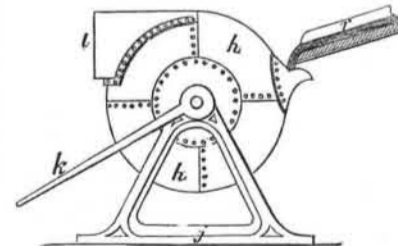
James Nasmyth, inventor of the steam hammer, in a letter to the *London Times*, respecting this invention, alludes to one of his own, which he states, Mr. Bessemer spoke favorably of, as being the means which led him to this invention. This was the use of a jet or jets of steam forced through the molten metal while still in the smelting or puddling furnace. Mr. Martien alludes to this in his patent, and disclaims it; it is not the same process; it is simply a method of agitating the molten metal in the furnace in which it is smelted or puddled, and is no doubt an improvement also. The same effect was accomplished previously by H. W. Woodruff, of Watertown, N. Y., and a patent was granted to him on the 9th October, 1853. Our Patent Office, in its zeal—not for assisting, but throwing obstacles in the path of some inventors—helped him to curtail his claim. The principle of his invention is the agitation of the molten metal, by generating jets of steam at the bottom of the molten metal in the cupola furnace, which jets passed up through the metal.

Fig. 3.



In the refining furnace of Mr. Bessemer, represented by figs. 1 and 2, we recognize a very good apparatus for carrying out the process of refining iron, invented by Mr. Martien but nothing more—the process is not the invention of Bessemer, and even in this furnace there is but little that is new; nothing but what would readily suggest itself to an iron smelter, because it is so similar in its construction to the common blast furnace.

Fig. 4.



"It may be said that Mr. Bessemer first perceived that the air of the blast united with the carbon of the molten metal, and thus it decarbonized itself. This amounts to saying, that he only saw more of the advantages of Martien's invention, that its author. This often happens with inventors. Blanchard, when he patented his gun-stock machine, did not see all the varied and useful purposes to which it might be applied, but that did not render it one whit less his invention. But we have been assured by Mr. Martien that he made a successful experiment in refining 2000 lbs. of crude iron by his process long before Mr. Bes-

semer made his later experiments, which have been so highly praised; and that some of Mr. M.'s refined metal was rendered malleable—decarbonized. This could not happen unless the air which he employed in his blast, combined with some of the carbon of the crude molten metal, and carried it off. It was therefore a practical demonstration, that his process accomplished the very thing which Mr. Bessemer claims for his, and being a prior invention, reduces his (Bessemer's invention) into that of Joseph Gilbert Martien, of Newark, N. J., now residing in London.

A correspondent of the *London Mechanics Magazine*, September 6th, questions Mr. Bessemer's title to the invention. He asserts that Mr. Martien's patent has, for its object "precisely that which Bessemer does, and he is at a loss how the invention can be Bessemer's." He also asserts that he does not see "how any one can deprive him (Martien) of the sole right to the use of a blast of air or steam rising up through and penetrating every part of the molten metal as it comes from the furnace." When the public comes to understand fully who is the real inventor of this process. Mr. Bessemer, will find his plumes, considerably ruffled.

Literary Notices.

THE NORTH BRITISH REVIEW.—The present number of this Quarterly,—esteemed by many to be the ablest of all the Reviews—contains eight excellent essays, one on "Christian Missions" is totally different from the one in the Westminster Review—is more thorough and trustworthy, and deserves to be widely read; another on "Holland and its Martyrs and Heroes" pays a high and deserved compliment to our countryman, Moley, for his History of Holland. No man can be intelligent respecting foreign affairs at least, who does not read the Quarterly published by Leonard Scott & Co., No. 54 Gold street, this city.

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