

# UNITED STATES PATENT OFFICE.

CHARLES LOW, OF THE COUNTY OF MIDDLESEX, ENGLAND.

## IMPROVEMENT IN THE MANUFACTURE OF IRON AND STEEL.

Specification forming part of Letters Patent No. 4,540, dated May 28, 1846.

*To all whom it may concern:*

Be it known that I, CHARLES LOW, of Robinson's Row, Kingsland, in the county of Middlesex, in that part of Great Britain called "England," have invented an Improved Method of Making and Manufacturing Iron and Steel; and I do hereby declare that the following is a full and exact description—that is to say—

I use manganese in the state of the black oxide of commerce, or in any other state of oxidation, plumbago or graphite, commonly called "black-lead," charcoal, and nitrate of either potash, soda, or lime. That which I commonly employ is the saltpeter of commerce. These four ingredients mixed well together in the following proportions, and apply in the following manner, viz: Of oxide of manganese I take forty-two pounds; of wood charcoal, fourteen pounds; of plumbago, eight pounds; and of saltpeter, two pounds. In the blast-furnace I add to every charge of ore likely to produce four hundred and eighty pounds weight of metal sixty-six pounds of the above mixture either with the iron, stone, or fuel, it being immaterial which, so that the proportions are attended to and regularly applied with each charge. In the puddling-furnace it can be applied with equal advantage when the pig-iron is in a fused state by throwing upon the surface of the metal, a few pounds at a time—say two or three, and continuing doing so at intervals of a few minutes, the puddler incorporating it by stirring it with the metal till the whole sixty-six pounds are used, or until the metal begins to thicken, or, as the workmen call it, "comes to nature." It is then balled and sent to the tilt hammer and rollers, and put through the usual process so well understood and practiced in making malleable iron. This being attended to, I have never found the result fail; but I have always obtained an iron of uniform quality, admitted to be much more fibrous and possessing a greater tenacity than any with which it has been compared, and capable of making excellent steel by the usual process of cementation or other process by which steel is made.

Another part of my invention consists in the use of the aforesaid mixture for improving the quality of iron by being applied in any of

the processes of smelting, puddling, and casting in the blast-furnace, the puddling-furnace, and cupola-furnace, or other furnace that may be used by the iron master or founder in like proportions, as above described, adding more or less of the compound, according to the quality of the metal used, of which quality the iron master or founder or his workmen will be able to judge; but I have found the quantity above named sufficient for the worst ore or metal.

Another part of my invention consists in the application of the above mixture to the manufacture of cast-steel from malleable iron, which has been made by the above processes. To effect this I add from two to three pounds of the above-mentioned mixture to every thirty pounds of steel when in the melting-pots during its conversion into cast-steel; or the object may be more immediately effected by adding the ingredients in the same relative proportions as for steel to the malleable iron made as above, and then the application of a moderate heat (such as a little practice will enable the workmen to ascertain) will fuse the iron in contact with the mixture and immediately convert it into cast-steel. I recommend as the best way of preparing the ingredients for use that they should be ground in a mill suited to such purpose. For the puddling-furnace they should be ground to a moderately-fine powder, and I should prefer their being applied from the top of the furnace through a hopper or tube, or such like means as would spread them more evenly than if applied by hand from the furnace-door; but for the blast-furnace and cupola-furnace they would be better applied in a coarser state. I have made my calculation upon four hundred and eighty pounds weight of metal, having found that to be the charge of pig-iron usually applied at one time to the puddling-furnace; but the workmen will have no difficulty in judging by the working of the metal whether a less or greater quantity of the ingredients should be used.

I do not claim the exact proportions as above described, as they must somewhat vary for different qualities of iron-ore and iron or of the ingredients themselves; nor do I claim the use of any of the aforesaid ingredients

separately, as they may have been made use of before; but

I claim—

The use of them collectively and in the proportions herein substantially set forth in the manufacture of iron or steel, either in the blast-furnace, puddling-furnace, cupola, or other furnace, or in the melting-pot.

In witness whereof I, the said CHARLES LOW, have hereunto set my hand this 30th day of November, 1844.

CHARLES LOW.

Witnesses:

WM. FIELD,

WM. JNO. ARNOLD.