

OF STEEL

THE MANAGEMENT OF STEEL.

ON THE FORGING OF STEEL.

STEEL being one of the most valuable metals and requiring great care in the forging, hardening, tempering, annealing, and Management of it in general, I think, after having had nearly twenty years' good practice, experience, and study combined, I am now able to give a little information to those who have not had so much to do with it as I have. All that I here state is from my own practical experience; and by following the plans I shall here give, the artist will meet with every success. There are many people who, for the want of a little useful knowledge on steel, refrain from making many a good tool, because they say it is sure to crack in hardening ; but if the steel is good, and has not been spoilt in forging the article, then, by following MY Plans they never need be afraid that it will be a "waster." There are tons of the very best steel condemned as bad steel-when at the same time it

is the forging of it that has made it bad, through men not having a proper knowledge in the management of it; and those masters who study their own interest will only employ those men for the forging of steel on whom they can most depend. For I have seen plenty of the very best steel destroyed, and have even heard men remark to each other, "Make it well hot-it will work the easier;" and I felt what a sad thing it was to see men that knew better; yet they would destroy their employer's property. Therefore I say, as justice to the manufacturer and supplier of steel, it behoves masters to put those men only at the forging of steel on whom they can most depend.

In forging of cast steel the fire must be regulated by the size of the work; and in heating the steel, when the flames begin to break out, beat the coals round the outside of the fire close together with the slice to prevent the heat from escaping. To save fuel, damp the coal, and throw water on the fire if it extend beyond its proper limits. To ascertain the heat of the steel, draw it out of the fire, and that often, for it requires to be well watched to heat the steel properly; and if not hot enough, thrust it quickly in again. Soft coke is even better than coal for the fire. The heat the steel receives is judged of by the eye; and care should be taken not to use a higher degree of heat than is absolutely

necessary to effect the desired purpose, and to use as few heats as possible; too frequent and overheating steel abstracts the carbon, gradually reducing it to the state of forged iron again. It is an idea of many men, that so long as the steel does not fly to pieces when they strike it -with the hammer, it is not too hot; but it is an erroneous idea, and easily proved when it comes to be hardened, and when it comes to be used; still it is an idea that many men will maintain, but only for the want of knowing better, and I hope that this will have the effect of altering their opinion. I can safely say that no man will ever injure the steel by being too careful how he takes his heats. Cast steel may be welded by boiling sixteen parts of borax and one of sal ammoniac together over a slow fire for an hour, and when cold grinding it into a powder. The steel must then be made as hot as it will conveniently bear, and the borax used as sand.

ON THE HARDENING OF STEEL.

My object now is to show to the reader some of the chief causes of steel breaking in hardening, and likewise to give a few remedies to prevent these causes; and I am sure, from my own experience, that whoever tries them will find them correct. In the first place, I wish to apprise the reader that all