Practical Hints for the Factory or Mill Superintendent.

There are so many excellent technical publications issued throughout the world that even the most ambitious superintendent could not afford to read them all to get the cream of their articles. We propose in these pages to give some of the most practical hints and suggestions which appear in the technical press in all countries.

Science in the Foundry.

By Wm. H. Hearne.

The selection of pig iron, its mixing and melting in the foundry, are becoming a matter of much more interest than formerly. Twenty-five years ago there was not a foundry in the United States that had a chemist in its employ, and scarcely a blast furnace running on foundry iron had a laboratory. Foundry pig iron was bought, sold and mixed entirely by its appearance and the experience the foundryman had had with the same brand previously. At that time this was a comparatively safe and satisfactory method to pursue, for the reason that at that time the ores and fuel from which each furnace made its product were largely drawn from local sources, and the name of the district in which the furnace was located told from what the iron was made.

The great growth of the iron industries since that time, the development of the railroad systems and the increased facilities the railroads offer for the assembling of materials, make it necessary for the foundryman to know either the analysis of the pig iron, or the ore and fuel that are used.

The chemistry of foundry practice is one of elimination, and this has been the cause of the almost limitless specifications. Really there is practically no positive knowledge, but all knowledge has been acquired by experiments, and most of these experiments have been made by men having preconceived ideas of the results to be attained. This, of course, is natural, and is probably the only way to go about it. The result is that an experiment is made with iron running silicon 2.50, phosphorus 0.80, sulphur 0.035, manganese 0.40, and the experimenter discovers that he has made a satisfactory casting. Consequently, when he wants an iron for this kind of work he demands iron of exactly this analysis, not knowing whether or not, if he had iron of silicon 2.00, phosphorus 1.10, sulphur 0.05, manganese 1.25, he would get the same result, and possibly a much better and sounder casting, for the phosphorus is, if anything, a greater fluidizer than the silicon, and the manganese is a powerful oxidizer. When the second iron is melted he would lose at least one-third of the manganese, and with it would go the sulphur from his iron and possibly some picked up from his fuel This will be especially true if he will tap his iron from the cupola into a big mixing ladle so as to give the manganese time to act.

There are four things necessary for a good foundry mixture, fluidity, soundness, softness and strength. How is fluidity to be attained? First, by hot melting, second, by the presence in the pig iron of certain alloys carbon, silicon, phosphorus and manganese and by freedom from sulphur. Practically pure iron is white and will not run at all, but will melt into a sponge and burn before it will run.

In ordinary foundry pig iron there is about 93 per cent. of metallic iron and about 7 per cent. of alloys, and it is the proportion of these alloys to each other that determines the character and grade of the iron.

The real softness of a casting depends on the total amount of carbon and on the proportion of graphitic to combined carbon.

In pig iron the proportion of free, or graphite, to combined carbon depends entirely on the rate of cooling, and the slightest accident at the time of casting will affect this proportion, and will change iron which should be 2X foundry to 2 plain or 3 foundry.

Chief among the foreign elements in pig or cast iron that affect the carbons chemically, is silicon. This element has the property of throwing out of solution the carbon in the graphitic form, and many melters seem to think it the only cure for all hard iron. Everything else being equal, it is safe to say that an iron carrying 2.50 per cent. silicon is a softer iron than one carrying 2 per cent. silicon. Silicon is not in itself a softener; it acts so only by affecting the carbons. An iron with 10 per cent. silicon can scarcely be drilled. Pig iron with 4 per cent. silicon will not contain as much total carbon as one of 2.50 per cent., as the silicon unites with the iron and robs it of some of its carbon, so that a high silicon pig iron never has the dark, open fracture of a 2.50 to 3 per cent. silicon iron.

Sulphur in Castings.

Sulphur is the most dangerous enemy of soft, sound castings, as it not only tends to combine the carbon, but by doing this, also causes the grain to close up quickly, and to retain in little holes or sacks gases which might and should escape. In this way it causes the casting to pit and be porous.

If iron can be kept fluid long enough the sulphur will all rise through the iron and pass off, as can easily be proved by drilling holes in any piece of iron of reasonable size, poured in open sand. If three holes are drilled, one above the other, the proportion of sulphur in each set of drillings will vary as the height.

The problem, then, is to give the sulphur a chance to get away before it is locked in the casting. There are many ways to do this, but the easiest and simplest is by using an iron carrying a fair percentage of manganese, with a large mixing ladle. In special cases it can also be done by putting into the mixing ladle a small amount of pulverized ferro-manganese, or a small amount of fluorspar or of aluminum. Any of these additions will cause the iron in the ladle to boil, and during this boiling the sulphur will be thrown off, and, as your molder will say, the iron is cleaned. Being free from sulphur, your casting will be soft as it will have the proper proportion of graphitic carbon. Most of the so-called patent fluxes for making soft steel castings are nothing but pulverized ferro-manganese, fluorspar, and powdered high ferro-silicons. Every foundryman can obtain these alloys himself and make his own fluxes.

The casting of pig iron in chill moulds has very little, if any, effect on the character of the iron, especially if the foundryman uses a mixing ladle. It does not affect the total carbon at all, if anything, it rather increases the amount of this element It somewhat increases the total combined carbon, owing to the sudden cooling or chilling of the surface; but if the iron contains the proper amount of alloys and is melted hot and tapped into a mixing ladle, the casting will be as satisfactory in every respect as though the pig iron had been sand cast. In addition, the chilled casting eliminates one source of trouble, i.e., the sand or other dirt in which the sand-cast pig iron is run

Streaks in Woolen Goods

From The Textil Zeitung.

Longitudinal streaks from any cause are a source of trouble, but the blame for them often lies with the finisher. They are more liable to occur in finishing hanks than pieces, as furrows are often produced in washing, and especially in milling, where the pressure of the milling rolls is great and the temperature fairly high, to say nothing of the presence of moisture. Unless the goods are carefully turned over during the process, i.e., if they pass between the bowls always in the same position, the furrows become accentuated and almost ineradicable.

In the first place, raising streaks may be caused by bad setting of the teazle frames. This makes some of the teazles penetrate deeper than others, so that they loosen the felt more than the other frames. This is a common cause of streaks, and the more so, the lighter the raising is. In raising heavy goods, the frequent changing of the teazles prevents this streaky trouble to a large extent. There is another danger with a slightly raised goods, i.e., that the finest part of the teazle is in the middle of it. This is, nevertheless, easily avoided by changing over the goods so that the same teazle does not act always on the same line parallel to the length of the hank or piece. It is perhaps scarcely necessary to mention that the stiffness of the cards or teazles should be less for goods to be slightly raised than for those in which the raising has to be a searching. In light raising the teazles must be old and worn, and the brush roller lowered when commencing so that the teazles only just brush the fabric To ensure level raising, the cloth