### Metallurgic Notes.

*Aluminum Irons.*—A notable event of the past year was the publication of an important paper by Mr. Keep, of Detroit, giving the results of a careful series of experiments upon the influence of additions of aluminum to cast irons, with special reference to the improvement of inferior irons by such additions, so as to adapt them to foundry uses. The results of these investigations appear to establish the fact that small additions of aluminum (in the form of ferro-aluminum) up to one per cent exert a distinctly favorable influence on cast iron, permitting the production of soft and faultless castings from irons heretofore regarded as altogether unfit for foundry use. Some question has been raised as to whether the results noted by Mr. Keep should not be attributed, at least in part, to the silicon in the aluminum alloy he employed; but the preponderance of evidence appears to be in favor of the view that the influence of small additions of aluminum to cast iron is no less marked and favorable than it is known to be in the case of wrought iron. The interest excited by the announcement of these results is shown by the fact that a considerable demand has lately sprung up for ferro-aluminum for foundry use. Should Mr. Keep's results be verified in practice, they will prove of the highest importance to foundrymen.

It is worthy of notice, in connection with the unusual share of attention that has of late been given to the subject of the cheap production of aluminum, that the general sentiment among metallurgists respecting the practical value of this metal has undergone a considerable modification. Sober second thought, now that the day of cheap aluminum appears to be drawing nigh, has dispelled many of the extravagant notions that formerly were entertained, even by men of science, respecting the possible utilities of this elusive metal. The more carefully its properties are studied, the more probable does it appear that it will always hold a subordinate place in the arts, and that its greatest utility will be derived from its alloys, which, with diminishing cost of production, will come into very general use in the arts of construction.

*Manganese Steel.*—The effect of the presence of manganese in steel has been made the subject of careful study, and it is believed that the constructive arts will shortly be the gainers by the possession of a metal possessing altogether new and highly valuable properties. The most interesting results have been obtained with steel containing as much as ten to fourteen per cent of manganese. It has been found with this material that, notwithstanding its considerable toughness when cast in the ordinary way, an extraordinary gain in strength is obtained by methods which, in the case of ordinary steel, would cause brittleness, water cracking, and other defects. The process is termed "water toughening," and consists in heating the article under treatment to about 1,800° to 2,000° Fah., and then plunging it into cold water. The nearer the above temperatures are approached, and the colder the water, the tougher will be the material. After water toughening, notwithstanding their hardness and stiffness, it was found that test specimens could be bent double, cold, almost in the same way as a piece of the mildest forged steel, thus proving that the new alloy combined the apparently contradictory qualities of hardness and toughness. It is believed that manganese steel treated by this toughening process will be found especially well adapted for railway car wheels, car couplings, and similar uses.—*Jour. Franklin Institute.*

### Refilling of Old Coal Mines.

An ingenious artifice that has lately been successfully put in practice at Shenandoah by the Reading Company, at the Kohinoor colliery, for refilling the excavations from which coal has been taken out, is worthy of mention, since it is desirable that it should be imitated elsewhere throughout the coal regions where similar conditions prevail. The method is both simple and effective, and prevents the caving in of the earth above, and the consequent loss of valuable property, which has not been infrequent in the mining towns of the anthracite region. Besides, the valuable pillars of pure coal, which for many years it was customary to leave in the mines to prevent falling in of the roof, can now be taken out without fear. A coal dirt conveyer, consisting of a series of semicircular chutes, similar to those used in discharging coal from carts into cellars, and an endless chain with scrapers attached, automatically conveys the fine refuse from the coal breakers to an elevation, from whence it is discharged into a second chute. As the coal dirt falls on this, water, pumped from the mines, mixes with it and carries the stuff, in a semi-liquid state, back through a jig or puddling hole into the bowels of the earth, from whence the coal has been removed. The coal dirt settles to the bottom of the breasts and packs closely, and the water seeks an outlet below, to be again pumped out to repeat its duty. The cost of this puddling the refuse matter back into the mines, about three to four cents per cubic yard, is very small compared with the value of the pillars of marketable coal of which the mines may be safely "robbed," and the security obtained for dwellings and railroad property on the surface, above the mines. Already more than two acres beneath the city of Shenandoah, from which the coal had been mined, have been again solidly refilled with the coal dirt which used to be piled mountains high around the town.—*Jour. Franklin Institute.*

### PHOTOGRAPHIC NOTES.

*Plates for Development with Plain Water.*—Mr. Leo Backelandt, a well known Belgian chemist, has just issued plates covered on the back with salts fit for the development of the image. It suffices to immerse the plate in ordinary water, and this immersion dissolves the reducing salts, and the image is developed. It is a very ingenious idea. We have just made a successful trial of these plates, and we think that they will be appreciated by amateurs desirous of dispensing with the trouble of preparing developing solutions beforehand. The fixing agent, ready powdered, is also inclosed in the box containing the plates; so that we have at once the sensitive film, the developer, and the fixing salt all to hand in the solid form. If the thing is really as good as it appears to be at first sight, what facility is offered for photographing on a journey in the country, etc.! We think that by the help of papers impregnated with developing salts the same result may be obtained, and then this method will be applicable to plates, papers, and pellicles of all makes.—*Leon Vidal, in Photo. News.*

*Rapid Hydroquinone Developers.*—A point of great importance is stated by Captain Himly, and his statement concurs with what has reached us from other quarters, namely, that the addition of a small quantity of caustic alkali to either the carbonate of potash or soda developers confers more brilliancy and more detail upon the negative, advantages independent of that for which it was added—its great accelerating influence. This is a very curious and unexpected result, the general effect of an accelerated developer when using pyro and ferrous oxalate not being in favor of additional brilliancy, at all events.

As to the use of meta-bisulphite of potash, Captain Himly finds that, when used in too great proportion, it retards development considerably, but is notably more powerful as a preservative in the solution than sulphite of soda alone. When color of the image is important, however, it is not desirable to omit the sulphite of soda, or even to reduce the amount of it, when meta-bisulphite of potash is used, as the former salt has such a beneficial effect upon the color of the deposit.

As the result of Captain Himly's researches, he recommends the following developer, here put into English measures:

HYDROQUINONE AND CAUSTIC SODA DEVELOPER.

*Solution A.*

| | |
|---|---|
| Hydroquinone | 40 grains. |
| Meta-bisulphite of potash | 16 " |
| Water | 2¼ ounces. |

*Solution B.*

| | |
|---|---|
| Caustic soda | 1 ounce. |
| Water | 8 ounces. |

To 5 ounces of water, ½ ounce of each the above solutions is added. This developer is recommended as very good for negatives, but not for positives upon bromide of silver emulsion paper, as the tone is very unequal, and for the most part of a reddish color.

HYDROQUINONE AND POTASH DEVELOPER.

*Solution A.*

| | |
|---|---|
| Hydroquinone | 40 grains. |
| Meta-bisulphite of potash | 16 " |
| Water | 2¼ ounces. |

*Solution B.*

| | |
|---|---|
| Carbonate of potash | 1 ounce. |
| Sulphite of soda | ½ " |
| Water | 10 ounces. |

For development, ten parts of A and from fifty to seventy-five parts of B are added to from fifty to twenty-five parts of water, according as it may be desired to produce a soft or a powerful negative. As accelerator, six minims of the one in eight solution of caustic soda above mentioned is to be added. The addition is stated to have also a favorable influence upon the color of the deposit. This developer is also recommended as very suitable for positives.

HYDROQUINONE AND SODA DEVELOPER.

*Solution A.*

| | |
|---|---|
| Hydroquinone | 40 grains. |
| Meta-bisulphite of potash | 20 " |
| Water | 2¼ ounces. |

*Solution B.*

| | |
|---|---|
| Carbonate of soda | 1 ounce. |
| Sulphite of soda | ½ " |
| Water | 10 ounces. |

For development, to ten parts of A from fifty to seventy-five parts of B are added, and fifty or twenty-five parts of water, as with the potash developer.

This developer also works noticeably better when six minims of the one in eight solution of caustic soda as accelerator is added. The developer works exceedingly well, both for negatives and for positives upon bromide of silver emulsion; and is especially good for the latter purpose, the tone being very even. It is recommended, before washing, to immerse the print for a short time in a dilute acetic acid solution, which discharges any yellow color that may have appeared upon the paper. The use of a bromide as a restrainer is unnecessary, this function being sufficiently fulfilled by the meta-bisulphite of potash.

In the table of comparative results given by Captain Himly, caustic potash shows a less favorable action than caustic soda, and the latter is therefore recommended. On other accounts—less cost and greater freedom from impurity—soda is also to be preferred.

The carbonate of soda required is not the powder sold under that name, and known also as sesqui-carbonate and bicarbonate, but the crystals. Washing soda, if moderately pure, generally answers perfectly. The precaution of using for the hydroquinone solution either distilled water or water that has been boiled and allowed to cool, must be observed, as well as that of thoroughly dissolving the sulphite—when sulphite of soda is used—before the addition of the hydroquinone. Sulphite of soda must be in good condition—must not have effloresced.

Development by hydroquinone has been making way by leaps and bounds. The present modification—that which removes the one most serious objection hitherto raised to its use (slowness of action)—appears at the same time to confer additional good qualities to the negative itself, and seems likely to bring the method into a much more extended application than it has hitherto enjoyed.—*Photo. News.*

### Time Servers.

How many men there are, holding good, paying positions as journeymen, who are really of no value unless kept constantly under the eye of the foreman or their employer! They are simply time servers, who take no interest in the business they represent beyond the actual time necessary to count them a day's work. They work when closely watched because they are obliged to, not from any motive of honor or interest in the business.

What can be expected of such workmen but that they will shirk their work and idle their time at every opportunity?

If you cannot give your employer your full time for which he pays, and take some interest in his business, you had better leave him at once. To this he is entitled, and has a right to expect it of you.

If your mind is not upon your work, you cannot expect to accomplish it with any degree of satisfaction to your employer or credit to yourself.

In going about from one shop to another it is a very easy matter to pick out the time servers. Upon the slightest pretext they drop their work to talk or look about, and are always ready to get out of the door the moment the clock strikes six, and their example is very rapidly followed by the apprentice or younger workmen. They have to be constantly watched, and this fact, being known to the firm, is not long in having its results.

Employers are more generally knowing to the habits and qualities of the men they employ than the men often realize, and they invariably know who are the time servers among them, so that when there comes a convenient opportunity or a lull in business, these are the first to be discharged.

It pays to be faithful and to do your best at all times, and more especially when your employer is not watching. If you must idle away time, do it when he is about, but don't dishonor yourself or betray his confidence by taking advantage of his absence.

This is one of the worst features of our American system. It is an example which is set by the older men, and which is readily adopted by apprentices, and it is the exception rather than the rule that we find a young man who is sufficiently interested in his own welfare and his employer's as well to give his full time and attention to his work. Those who do this are sure of success, and it is from among such that have risen those men whose names are written upon the pages of history as having made their mark in the world, and left behind not only pleasant recollections, but a shining example that is worthy of a careful imitation.—*The Practical Mechanic.*

### Peach Stone Fuel.

It has been demonstrated in Vaca Valley that peach stones will make as good a fire for household purposes as the best kind of coal in the market, says the Vallejo (Cal.) *Chronicle.* The fruit growers, instead of as heretofore throwing the pits away, dispose of the stones at the present time at the rate of $6 a ton. A sack of the stones will weigh about 80 pounds and will last as long as an equal number of pounds of coal, and give a greater intensity of heat. At many of the orchards in the valley may be seen great stacks of peach and apricot stones which will eventually find their way to San Francisco and other places to be sold for fuel. The apricot stones do not burn as readily as the peach, and will not command as good a price. The fruit raisers will undoubtedly be pleased to learn that they now have another source of revenue open to them. A large number of peaches are dried during the summer season for shipment. As soon as the owners find that they have a market for the stones, a greater number of pounds will be dried than heretofore.