Scientific Museum.

To Prevent the Oxidation of Iron.

One method consists in the addition of pig iron, when in a state of fusion, of from 2 to 10 per cent. of copper, tin, nickel, or antimony, by which addition, the iron is rendered more malleable and less subject to oxidation. A second method consists in the giving to the iron a coating of steel, or rather a species of iron containing less carbon and of course approaching to steel. This is effected by the addition of one part of blister steel to four parts of molten cast iron, and then adding scrap iron to the mass, until an iron rod is no longer rendered brittle by being dipped in the mixture. With this compound, common iron is coated in the same manner as pursued in the case of covering iron with brass; but various methods are pursued, according to the size and nature of the article to be coated; where it is at the end of a bar of iron, such as an axle, and is to be of a particular form, this form may be given to the crucible, thereby making it a mould, and when in a state of perfect fusion, the iron, either previously heated or cold, is to be immersed in the melted mass, and when it is perceived that the mass is perfectly fluid, than the fire may be withdrawn, or the crucible be allowed to cool by any available means; but when the iron to be coated, is immersed cold, the melted mass is immediately congealed, but it must be permitted to remain in the crucible till it again becomes fluid, and then it should be allowed to cool. If the whole is allowed to cool slowly, it is then soft, and may be turned in the lathe, and afterwards hardened by heating it and cooling it suddenly in the usual manner; but in this case care must be taken, as the coating and the iron have different powers of contracting. If the coated parts were suddenly immersed in water, it would certainly crack, the uncoated part must therefore be immersed up to the coated part, when the conducting power of the iron will cool the coating sufficiently quick to ensure a proper hardness.

A third method of preventing oxidation, is by case-hardening the metal, by the use of the ferrocyanide of sodium, calcium or barium.

In order to apply the ferrocyanide, an alkaline bath, formed with carbonate of soda, or other alkali is used. This bath may be a crucible or large basin built in the brickwork of the furnace, which should be a reverberatory furnace, and previous to being used, should be raised to a white heat; the iron to be case-hardened requires to be previously heated to nearly a red-heat, and then immersed in the bath, and there raised to a heat sufficiently high, after which it must be immediately immersed in the ferro-cyanide previously fused in another vessel; but if the quantity of iron to be case-hardened is small, it would not be advisable to fuse the ferro-cyanide (as it is very soon decomposed,) but immediately on taking it out of the bath it must be sprinkled with the ferro-cyanide; should ferro-cyanide of potassium be used, it is found that the alkaline bath prevents effectively the corroding of the iron.

A fourth scheme consists of a method of coating copper, or the alloys of copper or iron, with platinum. Platinum is dissolved in aqua regiæ, and the iridium which remains undissolved as a black powder, separated by filtration, then evaporated to dryness, and when cold a quantity of caustic potass, equal in weight to the metallic platinum employed is to be dissolved in water, and poured on the chloride of platinum. This will precipitate the platinum of an impure yellow color; a quantity of solution of oxalic acid equal to the weight of the metalic platinum, is now to be added without pouring off the solution which remains on the precipitate; the solution is then to be boiled till the precipitate is entirely dissolved, a small quantity of iridium will still remain, which, together with any other impurities, must be separated by filtration; caustic potass equal to twice the weight of the metallic platinum is to be dissolved in water and added to the above. The solution is now ready for platinising the copper or iron article which is to be coated with platinum. The article to be coated is to be put in a vessel of glass, or earthenware, and the above solution is to be poured in, sufficient to cover it. It is then to be connected with the positive pole of a Daniel's or Bunsen's battery of one or more pairs of plates, according to the size of the article to be coated, and a piece of platinum foil in connection with the negative pole is to be immersed in the solution. The deposition of the platinum in a metallic state, on the surface of the metal article, immediately commences, and is to be continued till the required thickness is obtained. All these plans may be very well, but for common purposes they must render the iron far too expensive.

Hollow Iron Moulding.

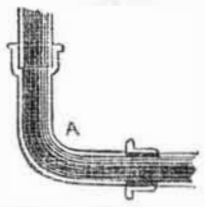
[Continued from page 48.]

Fig. 13.

Fig. 12.

In the moulding of the various lengths of pipe that are required for use, one pattern is made to answer. Pipe patterns are generally made nine feet long, of which an appropriate number of lengths are cast, when more than nine feet of piping is required. But shorter lengths also are frequently wanted, when of course the full length of the pattern would not be proper. The moulding, therefore, is cut to the required length; in technical language, the pattern is cut in the sand. In such a case, some preparation is necessary to form a new bearing for the core. For this purpose, two semi-circular pieces of wood, of the diameters of the mould and the core respectively, are sprigged together, end to end, as in fig. 12; and it is obvious that by placing the larger piece in the mould in each box, at corresponding parts, and ramming fresh sand about the smaller, the bearing will be formed. In like manner, if the piece of pipe terminate in a flange, the flange having been moulded in its place, a half flange of the same dimensions, with a half core-print on it, as at fig. 13, is set into the mould, and the bearings for the core made up. Small perpendicular branches required to be made upon pipes, are cast, either horizontally or vertically, as may best suit the form of the box. In the latter case, the branch pattern is set loose upon the pipe, projecting upwards between the ribs of the box, and having been moulded, it is drawn out, and its core set in upon the pipe core, and the whole covered in.

Fig. 14.



Besides straight pipes, others have often to be cast of different forms, requiring peculiar treatment. In arrangements of pipe works there is usually a number of knees or bends in their construction. These bends are usually cast separate from the straight portions of pipe, having facets upon them by which they may be afterwards joined to the pipes. The annexed, fig. 14, is a longitudinal section of a square knee in a line of pipes, showing the method of junction by spigot and facet. The term spigot, it may be as well to observe, is applied to the small semi-circular ring upon the plain end of a pipe, (as may be seen in fig. 5;) facet denotes the cup mouth on the other end for receiving the spigot. There are usually patterns and core-boxes for pipe bends of the

Fig. 15.

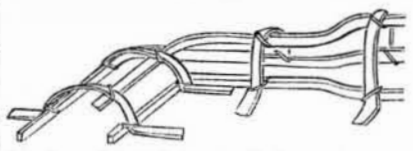
usual square-knee shape in which they are moulded in green sand. In the absence of patterns, however, for these and for other varieties of short piping, they are *swept up* in loam, the core within the "thickness."

In this process, the first point is to have a level iron plate set, upon which the work is to be done. Like patterns, the loam work is formed in two halves. The cores are executed in the first place, and when dried, the thickness forming the exterior of the casting are not laid on. Fig. 15 represents the guage usually employed in forming small pipe work. As already said, the work is done in separate halves, for which purpose semi-circular cuts are made in the guage, of which one is smaller than the other, being respectively the measures of the core, and of the additional thickness.

For example, suppose the bend, figured at sketch 14, is to be constructed, a small square rod of iron is bent to the form of the knee, against and along the side of which the guage is moved. A quantity of loam being laid on the plate in the line of the pipe to be formed, the guage in its progress fashioning the loam to its own form. When the two half cores are in this manner swept up, they are well dried and blackwashed, after which the guage is inverted, and additional loam being laid on for thickness, it is likewise shaped to the form of the pipe. The junction of the body of the pipe and the facet, which are of different diameters and of course require different sweeps, is scraped out by a file when the loam is dried; the head on the end of the facet is either formed by a pattern applied to the moulding. or cut out of the *cope*.

The loam pattern being thus completed in two halves, dried and blackened, it is bound together at two or three places by iron wire,

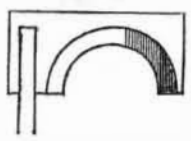
Fig. 16.



and bedded half into a sufficient quantity of old loam mixed with water and laid over the iron plate. The boundary of the loam is built up with fragments of cake loam. The bed being smoothed off on each side and dried, a layer of the same watered loam is applied to cover in the upper half of the pattern. As this upper layer has afterwards to be lifted whole, it requires to be strengthened by the addition of irons. With this view, pieces of rod iron, accommodatad to the form of the moulding, are laid on among the wet loam tranversely and longitudinally, and bound together by wires at the angles, constituting a kind of skeleton frame-work, fig. 16, for the cope, as it is termed, or upper structure. The irons are then covered in with old loam, which is smoothed over them, and the whole is for the last time thoroughly dried.

The building of the work being now completed, the next step is to undo it to clear out the thickness. The cope is lifted off carefully, leaving the rest of the work behind it, and this complete separation of the parts is one object for which the blackened or charcoal water is applied. In the same way the pattern is lifted out from the bed of the moulding.

Fig. 17.



The thickness is easily broken off the core, leaving the latter entire; the halves of which are next bound by wire, and replaced in the mould, stayed by bearings at the ends, and by steeples intermediately. The cope is replaced, guided to its former situation by intentional irregularities on the junction surface, and is bound by wires laying hold of the skeleton, to the under plate.

The gate is formed in the usual manner by a pin stuck in the cope while being formed.

For some small pipes, such as bends which are uniformly circular, circular iron-plates are frequently made to the same centre on both sides, so that when the cores are swept up on them, they lie concentric with each other. The edges of the plate will therefore serve for guides in the making of the core. For this purpose the guages are made as in figure 17, having a piece of wood nailed on and projecting downwards. By sliding this gauge along the interior or exterior edge, as it may be adapted for them, the pipe is formed as before.

Let not the moments of our life be spent in vanity.

Iron Convention.

The great convention of the iron makers which is to assemble at Pittsburgh in November, promises to be one of much interest and importance. The design of the convention is to ascertain the number and capabilities of the iron furnaces in the United States, and their present condition—together with the history of their operations for the past ten years, including the quantity of iron made, aggregate and cost of labor, yearly sales and nett profits, the annual consumption and actual cost at the several furnaces of agricultural products, and the quantity of iron that each furnace could make, and the number of hands it could advantageously employ if managed prudently, and furnished with a ready market at reasonable prices. If the convention should be fully attended and the delegates are prepared to report honestly and accurately on all these and kindred topics, the report will be an exceedingly valuable document, and the meetings of the convention may prove of great service to the immense and invaluable mining interests of our country.

LITERARY NOTICES.

Ranlett's Architect.—This great work, devoted to Domestic and Ornamental Cottages, together with Landscape Gardening, is now complete in twenty numbers. It is undoubtedly the most elaborate, comprehensive and useful work of the kind ever issued, and constitutes at once a practical guide for the erection of the best styles of country and suburban dwellings of every description, from the cheapest cottage to the most elaborate and expensive ornamental villa. The ground plans are all drawn to scale, accompanied by specifications and estimates of the cost of materials, used in the construction, enabling the contractor to arrive at the cost of every plan presented for his consideration. The want of such a work has been long felt, and Mr. Ranlett has done himself great credit, in supplying the vacuity which has so long existed in the publications devoted to Architecture. Its influence must be strongly felt throughout the country, especially in the great West, where cities and villages spring up as by magic. Aside from its valuable illustrations, plans, etc., the work contains several historical sketches of different styles, and essays on ventilation, the appropriation of light, heat and water; also, on contracting workmanship. The two volumes contain over 100 plates, many of which are beautifully tinted.

Bound volumes are worth $6 each, or 50 cents per number:—can be ordered from this office.