FOR THE HOME MANUFACTURER.

Hardening Iron.

Every improvement in the manufacture of iron, which is to us the "King of Metals," is to be hailed by the productive world as a positive blessing; and however slight those improvements may be, they deserve the attention of the chronicler's pen; how much more so, then, when they are important and practical, as are those we are about to mention.

The first is the invention of a French clergyman—Charles Pauvert, of Targe, France—and consists in purifying iron by chemical means. He places the iron in the cementing furnace, with 33 parts by weight of finely powdered charcoal, 33 parts of highly aluminous clay, 33 parts of carbonate of zinc or wood ashes, 1 of carbonate of soda, and 1 of carbonate of potash.—This produces in iron which has all the properties of the best steel and it will not lose any of its properties by being heated or drawn out. These substances, by chemical action, when heated together, present the carbon in the best possible state to combine with the iron. The method of producing cast steel from this is by melting it in a crucible with about 5 to 6 per cent. of the following mixtures:—4 parts of dry carbonate of soda, 3 parts of dry carbonate of potash, 3 of wood ashes, 2 of borax, 3 of oxyd of manganese, and from 4 to 7 parts of charcoal, or some highly carbonaceous body. The 4 parts of carbonate of potash may be replaced by 2 parts of caustic of potash. This produces a steel of superior quality, and with more certainty than by the old method. M. Pauvert patented his invention in this country, March 23, 1858.

The next invention is that of an Englishman—G. J. Fanner, of Birmingham, England—which consists in using ferrocyandide of potassium, hydro-chlorate of ammonia, and nitrate of potash in equal proportions. These are reduced to a fine powder and incorporated, and a bath made of the same substance dissolved in cold water, the prussiate of potash two ounces, the sal-ammoniac four ounces and the saltpetre two ounces to every gallon of water. Having now the powder and the bath, the article to be hardened is heated in an open fire or furnace, and rolled in the dry powder until the surface is covered with a pellicle of fused powder, and then it is plunged in the bath where it is left until cold, and when perfectly cooled, the mass is hardened. Large masses can be thus rendered extremely hard, but it seems to us to be especially applicable to the hardening of tools, journal bearings, and the like. This process was patented in the United States, April 6, 1858.

Last, but not least, comes an American invention, that of Horace Vaughn, of Providenee, R. I., and patented by him March 30, 1858.—He employs two pounds of bi-chromate of potash, twelve pounds of chloride of sodium, and four pounds of prussiate of potash; these ingredients are powdered and mixed together, and they are placed in an iron box, where they are covered with powdered charcoal, and heated in a proper furnace. The articles to be hardened are then placed in the mixture, and the whole heated until the mixture is in a state of ingenious fusion, when they are removed and dipped into water, oil or certain solutions in the usual manner. The proportions for hardening wrought iron are different, being 25 per cent. of prussiate of potash, 65 per cent. of chloride of sodium, and 10 per cent. of bi-cromate of potash; bone ash or animal charcoal or both are then added, and the whole is reduced to a state of igneous fusion, and the articles to be hardened are then put in.

Nearly all the inventions of late for hardening iron have been the result of chemistry, and we think that the more perfectly the chemical changes which occur in the transmutation of iron into steel are understood, the nearer we shall be to that great desideratum, making steel directly from the ore, which is the end to which all improvements in iron manufacture are tending.—[Sci. Am.

A NEW WHITE METAL.—A new alloy, which does not appear to tarnish more readily than ordinary white metal, and which is considerably cheaper, has just been discovered by Mr. W. Sharman, and it is thought probable that it will, to a great extent, supersede the various Brittania metals now in use. The alloy consists of tin, 16 parts; lead, 3 or 4 parts; zinc, 5 parts; and differs only from all similar compounds on record from the much larger per centage of zinc it contains. In the process of manufacture the zinc is first melted at as low a heat as possible, the tin is next added, and finally the lead. The whole is well stirred up with a green wood pole, to ensure perfect mixture, and to prevent oxydation, for which latter purpose a coating of borax and the addition of a little resin will be found useful. The whole operation must be conducted as quickly as posible, and excess of heat avoided. The proportions may be modified as required, more zinc giving less ductility, and more tin giving flexibility, and a better color. For teapots and articles of a like character, the alloy composed of 16 parts tin, 3 parts zinc, and 3 parts lead, is preferable. These alloys being easily fusible, care must be taken in the selection of the solder. The new alloy can be rolled and spun, and will, therefore, be easy of application to a large variety of purposes.

PECULIAR TREATMENT OF CAST-STEEL.—A New-York inventor proposes a new mode of treating cast-steel while it is passing from the molten state into that of being hardened or tempered, so as to obtain an article of a peculiarly soft, tough, malleable quality. To this end moulds are first prepared of a quality adapted to stand the most intense heat. These moulds are then heated to a degree nearly equal to that at which the steel melts, and in this state of the moulds the melted metal is poured into them. It is kept in the moulds heated to this high degree, and in the oven or furnace a considerable time, say from six to eight hours; after which the heat of the moulds is allowed gradually to subside until the steel in them has fairly congealed and is at a cherry red heat; the steel is then removed expeditiously from the moulds and immersed at once in a cistern of olive or whale oil heated to from six hundred to seven hundred degrees Fahrenheit. If the ingots or bars are more than one inch in thickness the oil is kept at that high degree of heat for several hours, and then permitted to become gradually quite cool; if less than an inch in thickness, a less time in the oil is allowed. By this process a very great degree of toughness, softness, and ductibility is imparted to the steel.

RUSSIA SHEET-IRON.—It is a popular notion that the process of manufacturing the tenacious and glossy "Russia sheet-iron" is a profound secret, and that the vigilance exercised by the Russian Government, and the Russian manufacturers, have hitherto successfully prevented all foreigners from obtaining the slightest information on the subject. The present Commissioner of Patents, in his last report, also alludes to the great, unsolved problems in science, which the industrial interests of the country require should be explained.

Mr. Wells in his recent work, "Principles and Applications of Chemistry," states that this current belief has no foundation in fact, and that the method of preparing the iron in question is perfectly well known. According to the authority quoted, "Russia sheet-iron is, in the first instance, a very pure article, rendered exceedingly tough and flexible by refining and annealing. Its bright, glossy surface is partially silicate, and partiallly an oxyde of iron, and is produced by passing the hot sheet, moistened with a solution of wood-ashes, through polished steel rollers."—[School and Home Journal.

A NEW MATERIAL FOR ROAD-MAKING.—The everlasting noise which is occasioned by the rugged material of our English roads, and the frequency of their being under repair, gives especial value to a fact which we find in the French papers. A new system of road-making has just been substituted for the ordinary road-way on a part of the Place du Palais Royal. A quantity of concrete, about five inches in thickness, is first spread out, and on that is applied a layer of bitumen reduced to powder and in a boiling state. On this latter, which is also about five inches in thickness, a a quantity of river sand is sifted, and then the surface is pressed down by a heavy cast iron roller, weighing about two tons. In a few hours after the road thus made may be passed over by the heaviest wagon without the slightest impression being left by the wheels. The same system is now being applied to the Rue St. Honore comprised between the Palais Royal and the Rue de Richelieu, and in the latter street as far as the end of the Theatre Francais.—[London Times.

BLUE OR RED PHOTOGRAPHS.—M. Niepce has added a note to his paper, which we published recently, containing some important details relative to the more easy acquisition of blue or red photographic pictures, in which prussiate of potash is used as the developing agent. After the insolation of paper prepared with prussiate of potash under a negative, a boiling solution, previously saturated with bichloride of mercury, is then poured upon it, and the picture is allowed to remain in this for two or three minutes, and then rinsed in pure water; after which a boiling solution of quadroxalate of potash, previously saturated cold, is poured on it, when a fine blue colour will be developed with great rapidity; the proof must then be washed in pure water, and it is fixed. To obtain fine pure red tones, paper prepared with nitrate of uranium must be heated to a temperature of about 120 degrees before exposure to the light; its action in this case being more prompt on the prussiate of potash.—[The Photographic News.

INDIA STEEL.—The steel made in India has long been noted for its surpassing excellence. It appears to be made from the magnetic oxide of iron. The ore is stamped to fragments, and the adherent quartz is separated by washing and sifting. The smelting is effected in the most primitive manner; the furnace is built of clay, and not more than four or five feet high. The bellows are formed of two goat skins, with a bamboo nozzle, tipped with a clay tube at the end which is to be nearest the fire; the fuel is charcoal. The iron is heated to a low red heat, and is beaten for a long time with stone hammers on a stone anvil. It is then converted into steel by being broken into small pieces, and put into small crucibles with a little dry wood, the crucibles are stopped up with clay, and are put into a furnace, where they are entirely covered with charcoal. A blast is then applied for two or three hours, the crucibles are removed, allowed to cool, broken, and the metal removed.

WHERE FINE SHAWLS COME FROM.—In Bockhara, the camel is watched while the fine hair on the under part of his body is growing. This fine hair is cut off so carefully that not a fibre is lost; it is put by until there is enough to spin into a yarn, unequalled for softness; and then it is dyed all manner of colors, and woven into strips eight inches wide, of shawl patterns, such as—with all our pains and cost, with all our schools of design and study of art—we are not yet able to rival.—These strips are then sewed together so cunningly that no European can discover the joints. They are then taken fifteen hundred miles to the borders of Russia to be sold.

WORKING UP SAWDUST.—The ingenuity of Parisian cabinet makers, in the Faubourg St. Antoine, has found a use for common sawdust which raises the value of that commodity far above the worth of solid timber. By a new process combining the hydraulic press and the application of intense heat, these wooden particles are made to reform themselves into a solid mass, capable of being moulded into any shape, and presenting a brilliant surface, a durability and beauty of appearance not found in ebony, rosewood, or mahogany.

The Sun an Engraver on Wood, Stone, Copper and Steel.

No science within the last few years has made so rapid progress as the science of photography; and brilliant as have been its former marvels, they are surpassed by more striking successes achieved almost within a month. Sun pictures on silver and paper have been made almost as common as newspapers in every household, even the poorest; portraits which otherwise would have been beyond their means, and which, a hundred years ago, regal opulence could hardly secure. This was a great addition to the happiness of the world for any art to contribute. But its devotees still asked for more; and more they succeeded in obtaining.

Petzval pressed the most subtle mathematical analyses into the service of the art, to make its pictures more accurate in drawing, and more rapid in execution. M. Niepce then showed how the sun could be made to do the work of the lithographer. He covers a lithographic stone with a solution of bitumen in ether; over this he places any photographic picture on glass or paper, or an engraving. This is subjected to the action of the light. The stone is then placed in a bath of ether, the portions on which the light has acted being soluble and the other portions insoluble. The stone is removed from the bath and a delicate picture is found sketched on it by the insoluble portions of bitumen, from which lithographs may be directly printed.

Our columns have related from time to time the various improvements of this sun-picturing art, especially in its relation to astronomy, where improvements have been as remarkable as in any other of its numerous branches. Our advertising columns have shown that photography was successfully applied not only to lithography but also to wood engraving, and that with the greatest success. All these impressions, however, are of little durability and permanence, compared with those on copper.

From the London News, we learn that Herr Pretsch has sought to make the sun a copper-plate engraver, and has succeeded. He finds a new property of matter as strange as that possessed by bitumen. He covers a glass case with a solution of gelatine, mixed with a solution of bichromate of potash and other chemicals, and leaves it to dry in the dark. On this plate he places his glass or paper picture which he wishes to engrave, and exposes it to the light. A faint photographic picture appears on the prepared gelatinous surface. This is dipped in water. The moisture raises the picture in relief. It is dried and found to be strong enough and deep enough to afford an impression, by pressure, to a warm sheet of gutta percha. This gutta percha impression has but to be covered with black lead or bronze powder, and placed in a voltaic circuit, to be covered with copper by the electrotype process—itself a wonder of wonders. The copper plate thus produced is in relief, but being placed in the matrix in the galvanic bath, it produces as many engraved copper plates as the engraver may require.

Fox Talbot, the father of English photography, goes a step beyond this. He places Herr Pretsch's solution of gelatine and bichromate of potash directly on a plate of polished steel. The picture is impressed on this film as before. He discovers that there is no necessity to peril its faintest lines by immersion in the water-bath. Over the faint photograph on the gelatinous film he sifts a thin layer of powdered gum copal, or even rosin. The plate is then heated over a spirit lamp, to melt the gum as in the common etching process. A solution of the peroxide of iron in muriatic acid is poured over the plate, which etches out its surface wherever the light has acted on the gelatine. And thus light leaves its delicate footprints on imperishable steel.

The engraver of the highest order, who is an artist as well as a manipulator, may still produce the best efforts of his art, but instead of having for his audience only the favored few, he may be admired by the million as well. The cartoons of the great masters, which fill choice niches in the royal galleries and grand cathedrals, the statuary which the pilgrims of the world go so far to see, the master-pieces in plastic and pictorial art, with all the wonders of nature and science visible to the microscopist or the astronomer, may thus at no distant day come to adorn the cottages of the poor.—[N. Y. Post, Nov. 18.

CRIME IN NEW YORK.—Burleigh, the New York correspondent of the Boston Journal, furnishes in a late letter the following facts and reflections:

Two things attract the notice of the observing—the crimes of New York are classified, and a division seems to be made among the nations that compose New York, and one can almost tell the nation to which a man belongs, by knowing the crime he stands charged with. The assaults and batteries are mostly done by the Irish; the thefts, receiving stolen goods, and that class of crimes, have fallen into the hands of the Germans and Jews; the burglaries are mostly committed by the English; and the frauds, forgeries, &c., are taken in hand by the Yankees. As a people, the French are freest from crime. The other fact deserving of notice is, that the heavy importing business is rapidly passing out of the hands of the Americans into the hands of foreigners, and the heaviest importers are now of that stamp, and the reason is, that these men have credit abroad and Americans have not.

The style of living adopted in New York the past few years has nearly ruined the American credit abroad. A foreigner comes here—he can live on $1,000 a year, and when times go well with him he can live on $5,000. But as soon as an American gets along at all, he must have his house and lot on Fifth Avenue, at a cost of from $100,000 to $200,000; his style of living must match, and the end is soon told. And by a foolish and vain and insane ostentation, the American is quietly and surely flinging away the great gift placed in his hands. And when one sees the luxury, the effeminacy, the indolence, the want of physical culture, among the children of those called our "first families," and then look at the keen wit, the sharp common sense, the physical energy of the poor, ragged or neglected children—the sons of coal heavers, draymen, and the poor—no one can be long in doubt from whence are to come the rulers and leaders of this country.

The Hot Winds of Melbourne.

Having mentioned, in passing, a hot wind, let me endeavor to convey some notion of what a hot wind really is. It is early morning, and as you look from your window, in the suburbs of Sydney, you see a thin, white vapor rising from the far-off bush. The sheep out there in the distance are congregated beneath the trees, while the old cows are standing knee-deep in those clayey creeks of water that trickle from the heaped-up rocks above. You have seen all this before, and know too well what it means. Before breakfast-time, there will "be" a hot wind. It comes. The white earth cracks as it passes over it, as though it were a globe of crystal struck by some invisible and mighty hand.

The air is hot and mirky, as the breath from an oven; and you see trees wither—the fruit shrivel and drop from the vines—as though the Last Seal were opened, and the breath of the destroying angel had gone forth. The cicades seem to shrink, (their shrill note is always shrillest in hot weather) and the birds drop dead from the trees.

The dogs in the street lie down and hide their dry protruding tongues in the dust. Higher and higher rises the mercury in the glass, until now, at noon, it stands at 147 deg.! You stop up every keyhole and crevice in your room to keep out the burning Sirocco, and endeavor, perhaps, to read. In a minute, stars dance before your eyes, and your temples throb like pulses of hot iron. You allow the book to fall from your hands, and strive to drop to sleep until the change arrives. The "Southerly Buster," as this change is called, generally comes early in the evening.

A cloud of dust—they call it in Sydney a "brickfielder"—thicker than any London fog, heralds its approach, and moves like a compact wall across the country. In a minute the temperature will sink fifty or sixty degrees, and so keenly does the sudden change affect the system, that hot toddy takes the place of the sherry cobbler, and your great coat is buttoned tightly around you until a fire can be lighted.

Now, if you look from your window in the direction where you saw that white vapor ascending in the morning, a spectacle terrible in its magnificence will meet your eye. For miles around—as far as the gaze can reach—bush fires are blazing. You see the trail of the flame extending into the interior until it grows faint and thin along the hill tops, as though a wounded deer had moved, bleeding, upon the road.

Nearer, however, the sight is grand and awful, and hints of the final apocalypse when the stars shall fall like those charred branches that drop with a thundrous crash and scatter a cloud of glowing embers around them. No matter where you live in Sydney, looking from your window across the harbor into the surrounding bush, you can always see sights like this after a hot wind.

The reflection upon the water itself is very fine. The emerald changes into ruby—the water into wine. The white sails of boats become of "purple" and "their prows of beaten gold." Everything seems bathed in an atmosphere of romance, and, if the impression were not lowered by the idea, the sheets of flame in the distance might be taken for the crimson walls of Aladdin's palace gleaming through the woods.

Sometimes these hot winds last for two or three days, and then the effects are something lamentable. Scarcely a blade of vegetation is left in the ground—the sere leaves fall from the trees as in a blast of autumn. The same week that I landed in Sydney, a hot wind lasted for four days, on the last of which no less than thirty persons dropped dead in the streets.

I remember I had a little garden to my house, and the white-starred jessamine was in full flower in front of the lower windows. Before the wind was over nothing remained but a bunch of dry sticks, kept to the wall by the pieces of cloth with which they were fastened.—[Southern Lights and Shadows; or, Life in Australia. By Frank Fowler.