Scientific Museum.

Edge Tools.

Experience has proved, that instruments which are the hardest acquire the keenest edge, and are the most capable of cutting; but then a great degree of hardness always occasions the metal to be brittle; and when the edge is very fine, such instruments are useless for dividing hard substances, because the sharp part is not tenacious enough to endure the operation without snapping asunder. It is necessary, therefore, to be content with less hardness, in order to obtain the requisite tenacity, and this is effected by the operation called tempering.

Hence, when an instrument has been properly hardened, it must be softened again in some measure, or to that degree which is thought to be most suitable for that particular purpose for which it is intended. To effect this, it is heated again only to a certain point, which is usually determined by the color which the metal assumes, and then it is instantly plunged into cold water. This is called letting it down to the proper temper.

In France it has been the practice, in hardening small steel instruments, to cover them with soft soap, and then to roll them in common salt. This treatment prevents the articles from scaling, and does not prevent the hardening. The salt fluxes to a glass, which covers the metal and protects it from oxidizement.

The usual mode of ascertaining the temperature to which any edge tool has arrived, is by attending during the operation to the shades of color, which, as the metal becomes more and more heated, the bright parts assume in rotation, and then when it has acquired that particular hue which may be desired, removing it from the fire into water. But the nature of the operation is such, that this must always be attended with some uncertainty, especially as different tools require different management in the process, and it is very often a very uncertain task to give the same temperature to every part of the same instrument.

In tempering edge tools, the first color, which appears at 430° of Fahrenheit, is very pale and only a little inclining to the yellow; this is the temperature at which lancets are usually tempered.

At a little higher temperature, say 450°, the pale straw color appears, which is a heat suitable for the best razors and most of the surgical instruments. Then comes the full yellow, at 470°, which is proper for common razors, penknives, and some other implements of surgery.

By increasing the temperature to 490°, the brown color will be produced, which is generally looked for by these who have to temper garden-hoes, small shears and scissors, and all those chisels which are designed for cutting cold iron. Then at 510° comes the brown, dappled with purple spots, which shows the proper heat for tempering axes, firmer chisels, plane-irons, and pocket knives. The next color in succession is the purple, at 530°, the heat at which table-knives and large shears are usually tempered. The next is the bright blue, at 550°, which will give a proper temper to swords, watch-springs, springs for trusses, bell springs, &c. Then comes the full blue, at 560°, which being the highest spring temper, is usually employed for small fine saws, daggers, augers, &c. This is the proper heat, also for tempering most of those instruments which require to be elastic. The last degree in succession is the dark blue, approaching to black, which shows itself at 600°, and is the softest of all the gradations of temper, when the metal becomes suitable to few other instruments than hand and pit saws, which are necessarily made very soft in the first instance, that the workman may be able to file them up, and set them, whenever they find occasion for it, without being obliged to soften them every time that operation is to be performed. This great heat is likewise employed in tempering some particular kinds of springs.

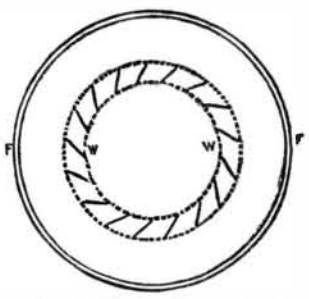
Some curious facts respecting the properties of blued steel, are related by Mr. Nicholson, on the testimony of Mr. Stodart, who says, "that he has found the spring, or elasticity of steel to be greatly impaired by taking off the blue with sand-paper, or otherwise; and, what is still more striking, that it may be restored again by the blueing process, without any previous hardening, or other additional treatment.

For the Scientific American.

Hydraulics.

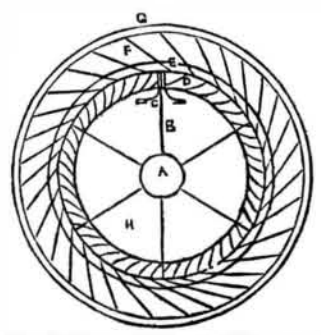
(Continued from page 192.)

Fig. 31.



The Centre Vent Wheel.—This wheel is named "Haviland & Tuttle's Vent." It was exhibited in New York two years ago in the form of a small model working in a glass case, whereby all its motions and behavior could be distinctly observed. It was patented a few years ago, and the patent contained a description of having the vanes or buckets made so as to be easily shifted, to increase or diminish the area of discharge. It was found in practice that the construction of the wheels with the movable floats, was expensive and troublesome, and did not confer the benefits anticipated. None of the working wheels therefore are made with the moveable vanes. F F, represents the glass case in which the model wheel was kept and run. The water was admitted by a pipe of croton supply at the top. It was injected from the outside and passed out down below through the central part. In reference to its performance, we find on page 26, Vol. 4, Sci. Am., that these wheels are manufactured at the Fulton Iron Foundry, South Boston, and that one wheel 5 feet in diameter, with a pair of 5 feet burr stones ground 40 bushels of corn into merchantable meal in one hour. The height of fall was 7 feet. The stones made 144 revolutions per minute; under a head of four feet, 25 bushels of good meal were ground in one hour.

Fig. 32.



Howd's Centre Discharge Wheel.—Fig. 32 is a plan view; A is the vertical shaft; B represents the arms; C are the hangers to suspend the rims; D are the rims and buckets; E is the bulkhead; F are the spouts to conduct the water to the wheel; G is the circular water gate. Mr. Carter Hughes, of Detroit, in his work "the American Miller," considers this kind of wheel to be superior to the overshot, and he says it is an error of principle in their construction to have the discharge of the water at the circumference instead of the centre. The centre discharge is considered the best by him. He believes the French Turbine to be wrong in principle and wrong of action. He condemns the working of Re-action Wheels by securing them on horizontal shafts.

Iron Pavement.

Iron is daily coming into more general use for almost every purpose. A letter from Paris, of a late date, says:

"A new pavement, to upset the Macadam and other inventions of the kind, has been proposed by Mr. Tobard, who intends paving, in his way, the streets and boulevards of Paris. This gentleman proved by figures that melting iron is only worth 11 francs in Paris, 7 francs in Belgium, and 4½ francs in England —whilst the stone costs 25 francs in London, 15 francs in Paris, and 8 and 10 francs in Belgium. This new mode of pavement will be grooved, in order not to become slippery, and it is said that the electricity occasioned by the rolling of the carriages will prevent rust."

[It is a common opinion among many men, that cast-iron rusts as fast as wrought iron; this is a great mistake. Cast-iron is almost anti-rustative. No person need be afraid of cast-iron going to decay by rusting. We have but little confidence in iron pavements for the streets of cities.

Take Care of the Feet.

"Of all parts of the body," says Dr. Robertson, "there is not one which ought to be so carefully attended to as the feet." Every person knows from experience that colds and many other diseases which proceed from the same, are attributable to cold feet. The feet are at such a distance from "the wheel at the cistern" of the system, that the circulation of the blood may be very easily checked there. Yet, for all this, and although every person of common sense should be aware of the truth of what we have stated, there is no part of the human body so much trifled with as the feet. The young and would-be genteel footed cramp their toes and feet into thin-soled, bone-pinching boots and shoes, in order to display neat feet, in the fashionable sense of the term. There is one great evil, against which every person should be on their guard, and it is one which is not often guarded against—we mean the changing of warm for cold shoes or boots. A change is often made from thick to thin soled shoes, without reflecting upon the consequences which might ensue. In cold weather boots and shoes of good thick leather, both in soles and uppers, should be worn by all. Water-tights are not good if they are air-tights also; india rubber overshoes should never be worn except in a wet splashy weather, and then not very long at once. It is hurtful to the feet to wear any covering, that is air-tight over them, and for this reason india rubber should be worn as seldom as possible. No part of the body should be allowed to have a covering that entirely obstructs the passage of the carbonic acid gas from the pores of the skin outwards, and the moderate passage of air inwards to the skin. Life can be destroyed in a very short time, by entirely closing up the pores of the skin. Good warm stockings and thick-soled boots and shoes are conservators of health, and consequently of human happiness.

To Dye a Good Black.

Rub a brass kettle with soft soap, turn upside down in a warm place twenty-four hours, then fill with soft water, rubbing the verdigris from the kettle into water. Put your logwood in a bag and soak in a warm place several hours. Put your cloth in wet, and boil gently two hours or more, airing constantly and stirring well. Wash thoroughly before dyeing.—[Exchange.

[This receipt will never dye a black, although the goods were boiled for a year in the logwood. To dye a black on wool, first have the goods clean, then boil them in an iron or copper vessel, along with three ounces of copperas and one of the sulphate of copper, to the pound of goods for about one hour. After this they should be taken out, quickly handled and dried and well dripped and boiled in a solution of logwood at the rate of half a pound to the pound of goods, for about one hour, after which they should be taken out, well dried and washed. This makes a blue black. If some fustic is used along with the logwood, the color is made a jet black. If the color be grayish, it wants more logwood, if brown, it has too much logwood. The logwood should be in a bag, or else boiled in a separate vessel, and the liquor only used. This will dye woolen yarn and cloth. The bichromate of potash is now used in place of the sulphate of copper. It makes a good and fast black and is an excellent mordant for white goods, but is not suitable for dyeing goods that may have had some other color. The receipt we have given will re-dye old goods. The goods should be well stirred and not crowded too close in the boiler. If not quickly handled when taken out, they will be wrinkled and consequently spoiled in a measure, for wrinkles are not easily taken out. Silk and cotton cannot thus be colored black.

Effect of Nitric Acid upon Bones and Flesh.

During the trial of Dr. Webster, in Boston, Professor Horsford testified that he had tried experiments upon the effect of nitric acid in dissolving bones and flesh. He selected the hock-bone of beef, using the commercial nitric acid. In about four hours and twenty minutes the bone had disappeared, and in an hour more the vessel was entirely clear, with no trace of the bone. The flesh disappeared in three or four hours. No smell was perceived. Professor Horsford thought it would take rather more nitric acid than the weight of the whole flesh and bone to dissolve a human body. In the experiments a little more than four pounds of acid were used to four pounds of bone.—[Annual of Scientific Discovery.

LITERARY NOTICES.

Statics of Gaspard Monge.—This is an elementary treatise upon a subject, without a knowledge of which no engineer, millwright, nor architect can be master of his business. The author of the work is a Frenchman, and the translator is Woods Baker, A M., of the U. S. Coast Survey. It is written and illustrated in that clear and philosophic style of authorship peculiar to Frenchmen. It is the best elementary treatise on the subject that we have consulted, and is for sale by C. M. Saxton, No. 123 Fulton st., N. Y.

Graham's American Magazine, for March, is a superb number, containing 144 pages of original matter, the same size as "Harper's" and the "International." Graham is determined to take the front rank in the Magazine line, and if this may be taken as a specimen, he will do it effectually. The contributions are of the most sterling character, and all by American authors. We wish this serial the largest success. Messrs. Dewitt & Davenport, agents.

Holden's Dollar Magazine, for March, is received. We notice that the Messrs. Duyckwick, Editors of the "Literary World," will conduct this Magazine for the future, Messrs. Fowler and Deitz retiring. The new Editors promise well, and we can say to the readers of Holden that they will do all they promise—they have the facilities and enterprise. We have always spoken warmly in praise of this Magazine. It deserves all we have said of it.

The Photographic Art Journal.—No. 2 of this Journal contains a likeness of M. M. Lawrence; it also contains Robert Hunt's Researches on Light. This periodical is a very able one indeed; it is a monthly, published by W. B. Smith, Ann st., New York.

Wacousta: by Maj. Richardson. This thrilling historical romance has just been published by Dewitt & Davenport. It is well worth perusal.