VALUABLE RECEIPTS.

Japanning Iron.—The term japanning is derived from a species of hard varnishing applied to articles that were originally obtained in the island of Japan. In Europe and America the term is now applied to articles of paper, tin, and iron coated with a varnish and dried hard in an oven. As an art, japanning was first practiced on metal in Birmingham, England, and it is still carried on upon an extensive scale in that city. In order to japan iron black, the metal is first cleaned to prepare its surface, then it is coated with quick drying oil varnish, colored with asphaltum and lamp-black, and when it is moderately dry, it is baked in a brick oven, gradually heated up to about 300° Fah. The oven used for this purpose is similar to that for baking bread. It is formed of brick, with a flue under the floor.

A good black japan varnish is made as follows: Take asphaltum 10 lbs. and gum anime 4 lbs. and 2½ gallons of linseed oil, and boil these in an iron vessel for about one hour; then add 2 lbs. of dark gum amber, 2 lbs. of litharge very slowly and cautiously, and boil until the varnish becomes stringy, when it is removed, cooled, and thinned for use with turpentine. When the litharge is added it is liable to fume over, therefore it must be fed in small quantities, and stirred with vigor during the period it is being put in.

Another black japan varnish is made with 8 lbs. of fused asphaltum, 2½ gallons of hot boiled linseed oil and 2⅓ lbs. of litharge, all boiled for two hours, when 1⅓ lbs. of dark gum amber are added, and the boiling continued until the varnish becomes thickish, when it is cooled and thinned for use with turpentine. It is put on the articles with a soft hog's hair brush, but some articles may be dipped in it. They are all partially dried before being baked in the oven. The oil is employed to make the varnish tough and waterproof. Asphaltum alone with drying oil may be used for coarse articles, such as iron castings. Superior japanned work is finished by rubbing down and a final coating given of lac varnish, which is made by dissolving gum shellac in alcohol. Amber is too expensive to be used for common japan work. The litharge that is mixed with the oil renders it quick drying by supplying oxygen to it. Common copal varnish, colored with ivory black, also makes a good japan varnish for iron work.

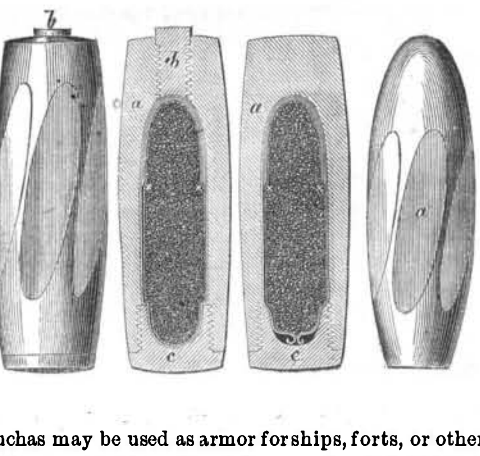
Laughing Gas.—The gas which is commonly known by this name, is more appropriately termed "intoxicating gas." It differs from common air in containing about one-third the quantity of oxygen to that of nitrogen; common air containing but about one-fifth of oxygen. In breathing, the carbon of the blood only combines with the oxygen of the air inhaled by the lungs. In common language "the blood is thus vitalized." With the greater quantity of oxygen inhaled in laughing gas, the action of the lungs is intensified, and the blood flowing therefrom to the brain produces a species of intoxication. This gas is made by putting a quantity of pure nitrate of ammonia into a glass retort, and applying the gentle heat of a lamp to it. Violent boiling in the retort must be avoided, or the gas resulting from the nitrate will be impure. The gas is carried from the tube of the retort through water, over which it is collected in a receiver, and from thence it is more usually taken in india-rubber bags for use. It must be allowed to stand a few hours in the receiver before it is used, during which period it deposits a white vapor, then becomes perfectly transparent. When great purity is required, the gas should be passed through a bent tube containing a solution of the proto-sulphate of iron. Four ounces of the nitrate of ammonia produce a cubic foot of this nitrous oxide. Phosphorus, sulphur, charcoal, and iron wire burn in this gas, when previously ignited and placed in it. A piece of potassium placed in a jar containing it and standing over water, inflames and burns brilliantly. This gas is not fitted to support life, yet it may be respired for a short period. It effect upon the human frame are very extraordinary. It is a sort of delirium, differing in its manifestations, according to the constitutions of the persons who inhale it; in general the sensations are pleasurable. In some persons there is an irresistible propensity to laughter, a thrilling of the toes and fingers, and a strong excitement to muscular motions. A stout fellow, whom we witnessed take a dose of it recently, had a strong propensity to violent and lofty leaping; another person dashed at once into a hornpipe of the most exciting heel-and-toe character; while a third tore Shakspeare into tatters with the most energetic theatrical declamations. In most cases it produces cheerfulness afterwards, but in some instances the effects are unpleasant, causing stupor and headache. Persons devoted to mental pursuits are liable to be injuriously affected, and should not partake of it.

WHITWORTH'S IMPROVED SHELL.

We transfer the following description and engravings of Whitworth's improved shell from the columns of the London *Engineer*:—

These improvements by Mr. Whitworth relate to shells intended to be fired through metal plates,

Fig. 1. Fig. 2 Fig. 3. Fig. 4.



such as may be used as armor for ships, forts, or other defenses. Shells, as heretofore made, have not been fired in an entire condition through armor plates of any considerable thickness, such as the thick plates of iron now commonly applied to ships to protect them from injury from projectiles; they have always broken up upon impact, and when used as live shells the bursting charge has ignited prematurely. It has, therefore, been supposed that comparatively much thinner armor plates would suffice to exclude shells than would be required to keep out solid shot propelled with an equal charge of powder. Now it has been found that one cause of the inefficiency of shells heretofore employed against armor plates has been that the concussion on a shell striking armor plates of any considerable thickness, and with velocity sufficient to penetrate it, generates so much heat as to explode the bursting charge in the shell, thus fracturing it before it has had time to pass through the armor-plating. Another cause of the inefficiency of shells heretofore employed against armor plates has been that the shells have been so weak that the force of the blow has been sufficient to fracture them mechanically; this weakness has arisen usually from the materials of which the shells have been formed being soft or brittle, or both, and in many cases also from the form given to the shell. It is essential, in the construction of shells capable of being used efficiently against armor plates, that the fracture of the shell from the causes above mentioned should be prevented.

In Figs. 1 and 2, *b* is a plug employed to close the passage through the front of the shell; the object in forming this passage is to admit of the body being more thoroughly hardened than it could be were the shell made solid in front; this plug before being screwed into its place is also hardened and tempered. *c* is another metal plug screwed into the rear end of the shell, for closing it after the charge has been introduced. The interior of the shell may be painted or thinly covered with bitumen, marine glue, or other substances such as are used for giving a smooth internal surface to common shells. The bursting charge, which may be powder, such as is commonly employed for this purpose, is then introduced, being first enclosed in a flannel bag or case, in order to prevent the heat generated by impact from being transmitted too rapidly to the bursting charge, and at the fore part of the bag, as far, say, as the points marked ×, ×, several thicknesses of flannel are employed, the number of thicknesses of flannel used being more or less, according to the effect it is desired to produce; the longer the time which it is desired should elapse between the perforation of the armor plate and the explosion of the shell, the greater will be the number of thicknesses of flannel employed. In place of flannel, other materials which transmit heat slowly may be employed, but flannel is most convenient. By these means the patentee is able to make use of the heat generated on the impact of the shell with the armor plating to fire the bursting charge, after the shell has penetrated through the plating.

Fig. 3 is a longitudinal section of a form of shell somewhat different from that shown at Figs. 1 and 2. In this case the body, *a*, is not bored through at the front. The shell need not be charged entirely with gunpowder; there may be just sufficient powder put into it to rend it, and the remaining space may be occupied by destructive or noxious chemical preparations. Gun cotton or compressed powder may be used with advantage for the bursting charge; or explosive agents of a more energetic nature than those may be employed.

The shells described may also be employed for penetration like solid shot, as by removing the center part of the forged piece, which is sometimes unsound, the metal may be made of the degree of hardness required, and which is varied, as described, in different parts of the body of the shell.

The shells shown are adapted to be thrown from a rifled gun with hexagonal bore; if a gun with any other form of bore be employed, a corresponding change will have to be made in the external configuration of the projectile.

Mr. Whitworth has found practically that a shell such as that shown at Figs 1 and 2, having a maximum diameter of 7 inches, and propelled by 27 lbs. of powder, will, at a range of 800 yards, penetrate with facility a 5-inch wrought-iron armor plate supported by a heavy backing of timber and iron skin. It will be remarked that the shells shown are flattened in front, and for penetrating armor plates it is very desirable that this form should be given to them. Where the conditions are such that the shell can be made to strike with its axis perpendicular, or nearly so, to the armor plating, a shell rounded in front may be employed, although even under these conditions it will not penetrate with the same facility as a properly-formed flat-ended projectile, but where the circumstances are such (as they would be in almost every practical case) that it is impossible to secure the shell striking with its axis perpendicular, or nearly so, to the surface of the armor plating attacked, then a shell rounded in front is deflected on striking the armor plating, and either glances off entirely, or expends its momentum with more or less inefficiency, according to the inclination at which it strikes. Shells with flat ends are effective if the object aimed at be below water. Shells constructed according to the invention, may, if desired, be fitted with ordinary fuses, and it is in some cases desirable so to fit them; they will not in this manner be rendered any more useful for employment against iron plating, for which they are primarily intended, but the fuses will enable them to be fired with effect if necessary at objects which will not offer resistance, so as to generate sufficient heat to fire the bursting charge within it, as for example in attacking such a ship as the *Warrior*, which is only partly protected with thick armor plate, the fuse would then insure the explosion of the projectile, which might not otherwise occur if the shell did not strike the thick armor plate.

An Improved Steam Carriage.—H. Roper, of Roxbury, Mass., has invented and completed a steam carriage, which, according to report, subserves the ends for which it was made. A recent trial of this innovation upon the "old style" was very successful; it passed through Boston, and, meeting a car on the horse-railroad, turned off the track, and went around the car, with as much e ase as if drawn by a horse. On a smooth road or on the rail, with sixty pounds of steam (the usual amount), the carriage can be run at the rate of twenty miles per hour. The weight of the carriage is 650 pounds.

The editor of the *Alta California* was recently presented with a sack of potatoes, containing only three, each weighing 20 pounds.