Gunpowder, Percussion Powder, and their Substitutes.

The following is the substance of a most able and interesting paper recently read before the Royal Society, London, on the above interesting subject, by Dr. Gladstone, an able chemist, who has devoted much attention to the question:

"Any great and sudden increase of volume may give rise to the phenomena designated explosion; but such great and sudden increase never takes place by the mere dilatation of a solid or liquid body; it is always necessary that gases should be formed. The simplest form of explosion is when a liquid is suddenly converted into a gas, either by the removal of pressure, or by the bursting of the vessel in which it was contained. The enormous expansion of gas by the removal of pressure is taken advantage of for the projection of missiles in the air gun, and in Perkins' steam gun. In these cases there is no chemical change; but usually an explosion is the result of a rapid chemical action between the different constituents of a mixture, or chemical compound, by which substances are produced that occupy a very much larger space than the original combination did. Such an explosion is always attended with heat, and generally with light and noise. The substance exploded may be a mixture of two or more gases; for instance, if the fire-damp of the mines be set fire to in the air, it burns quietly enough with a luminous flame; if, however, it be previously mixed with air, on being ignited the flame passes instantly throughout the whole mass; and if mixed with twice its volume of oxygen, this takes place with great violence and a loud report. One atom of carburetted hydrogen combines with four atoms of oxygen to form carbonic acid and water. In this case, however, the gases produced by the explosion would actually have occupied less space than the original mixed gases, and a positive contraction would have ensued, had it not been for the high temperature at which they were formed. In order to obtain very great expansion we must not start with a gaseous mixture. Solid or liquid oxygen is a desideratum, but it can be procured in that condition only when in a state of combination. There are several salts which contain a large quantity of this element, and which give it up with great facility—the nitrates and chlorates of potash or soda, for instance.

In exploding, gunpowder produces carbonic acid and nitrogen gases, and sulphuret of potassium, which is also dissipated by the great heat evolved, and if it reach the air is converted into sulphate of potash, giving rise to the white smoke that follows the explosion. Besides these gases, some others are always produced in small and varying quantity. It is supposed that, at the moment of explosion, the heated gases occupy fully 2,000 times the volume of the original powder. By mixing different combustibles with nitre, various effects may be produced on explosion; sometimes the light, sometimes the heat, and sometimes the noise, being the most remarkable. When nitre was an article of scarcity in France, the French chemists made many experiments with a mixture of chlorate of potash, charcoal, and sulphur; but this compound, though a good explosive, has several disadvantages, which have prevented its ever coming into extensive use. A white gunpowder has more recently been prepared by mixing chlorate of potash with yellow prussiate of potash and sugar. The explosives hitherto described are all mixtures. There exist substances which contain all the elements of combustion within themselves, and which require only a slight elevation of temperature, or a smart blow, to alter their state of chemical combination, and suddenly to produce gaseous bodies in large quantity. Pre-eminent among these is gun-cotton, a substance formed by immersing cotton in a mixture of nitric and sulphuric acids.

It is generally allowed now that this compound consists of lignine, C.24, H.20, O.20, in which a portion of the hydrogen has been replaced by N.O.4; difference of opinion exists as to the amount so displaced, but Dr. Gladstone had found it to be five atoms in the most explosive gun-cotton, three in that of inferior quality, which he designated cotton-xyloidine. The most explosive compound produces a sudden flash, but no smoke or loud noise, and leaves no residue whatever. Hydrocyanic acid is among the resulting gases. Nitroglycerine, a liquid produced in a similar manner from glycerine, is of so explosive a nature that if a single drop be struck by a hammer on an anvil, it gives rise to a deafening report. Its composition is C.6, H.5, 3 (N.O.4,) O.6. Similar to this is nitromannite, which also explodes by percussion.

(Concluded next week.)

Recent Foreign Inventions.

Preserving Meat—Jean Wothly, of Zoffinger, Switzerland, has obtained a patent for the following method of preserving meat: The meat is first cut into pieces of about ten pounds in weight, and separated from the bones.—These are then dusted over with sugar and salt, and allowed to stand about two days, and are then subjected to pressure, in order that all the blood and serous matter may be forced out; or in place of being pressed, they are moderately cooked before packing. They are then placed in casks lined with melted fat.

Each piece is covered with a piece of white paper well greased, packed in the barrel, and fat is poured in to fill up the spaces between the pieces. This meat cask is then closed, and placed within a larger one, and the space between the two filled up with sand, which is a good non-conductor. This is certainly a novel method for preserving meat. It is stated to be good, but troublesome. Part of the plan might be tried by some of our farmers in laying down their winter beef, viz.: all but the partial cooking and packing in a double barrel.

Preserving Meat and Vegetables—Geo. Nasmyth, of Kennington, England, has taken out a patent for boiling cans, containing meat, (and which are afterwards to be soldered up tight,) in a fluid such as alcohol, which boils below the heat of water—212 degs.—in order to expel the air—an absurd idea.

Composition for Ship's Bottoms—Thomas Harrison, of Hackney, England, ship owner, has taken out a patent for the following composition to cover the bottom of ships, and which may be very useful for coating spiles for wharfs, such as those in San Francisco, where the ravages of the ship worm are exceedingly destructive. In an iron vessel 35 parts by weight of pitch are melted, to which 35 parts of fine ground chalk are added. These are first well mixed by stirring, then 25 parts of ground barytes, and 5 of sulphate of copper are added, and well mixed together. The whole is then allowed to cool to 100 degs. Fah., and as much crude naphtha, or spirits of turpentine, is put in it as will render it fit to be put on easily with a brush. It is applied while warm. It is rather remarkable that a great number of patents have been taken out in England during the past two years, for such compositions, while in our country, although as largely interested in obtaining a good coating for ship's bottoms, no attention seems to have been given to the subject.

Cartridges for Fire Arms—Capt. John Norton, of Dublin, Ireland, has obtained a patent for the use of fulminating powder as a priming for cartridges, to cause an explosion through the unbroken cartridge case; also for puncturing the case of cartridges at the base, to enable the charge to be ignited from the flame of the cap of the nipple. This latter part of the invention is the same as that embraced in the Marston American cartridge, illustrated on page 129, Vol. 8, Scientific American.

Destroying the Vapors of Boiling Oil—F. W. East, of London, has taken out a patent for arranging the furnaces and flues of a boiler for boiling bones, or oils, or other matters that give off noxious vapors, so that by means of a fire in addition to that employed to heat the boiler, a draft is established to induce currents of air to flow over the surface of the boiler to mingle with the oil vapor, and be then conducted under the secondary fire, where they are burned. A plan similar to this was tried in this city some years ago, in order to remove the nuisances of noxious vapors, arising from some bone boiling establishments. The vapors were caught by a bell mouthed cap, and conducted by a pipe into the furnace. It was stated to be perfectly successful, and yet, so far as we know, it has never been carried out into general practice.

Portable Cooking Apparatus—The London *Mechanic's Magazine* states that J. E. Gardner, of London, has obtained a patent for an ingenious arrangement of all the various utensils required for boiling and frying, so that they may fit closely into one another, and be compactly stowed into a small leather case. With these there is also a cooking lamp, so as to enable sportsmen or travelers to carry about with them the means of cooking their food in a Christian-like manner, in wood or wild. These little knick-knacks sometimes form very profitable patented articles, for they are both useful and necessary to a very large class of persons in every country.

Notes on Sciences and Art.

Gold in the Arts—It has been ascertained that in Birmingham, England, not less than one thousand ounces of fine gold are used weekly, equivalent to some $900,000 annually; and that the consumption of gold leaf in eight manufacturing towns is equal to five hundred and eighty-four ounces weekly. For gilding metals by electrotype and the water-gilding processes, not less than ten thousand ounces of gold are required annually. A recent English writer states the consumption of gold and silver at Paris at over 18,000,000 of francs. At the present time the consumption of fine gold and silver in Europe and the United States is estimated at $50,000,000 annually.

Return of the Great Comet—The eminent astronomer, M. Babinet, member of the Academy of Sciences, and M. Bomme, of Middleburg, Holland, have been making some interesting investigations in respect to the return of the great comet which appeared in the years 104, 392, 682, 975, 1264, and 1556. M. Bomme has gone over all the previous calculations, and made a new estimate of the separate and combined action of all the planets upon this comet of three hundred years, the result of which severe labor gives the arrival of this rare visiter in August, 1858, with an uncertainty of two years, more or less.

Microscopic Photographs—Some microscopic photographs exhibited at Manchester, England, have excited much admiration. One of the size of a pin's head, when magnified several hundred times, was seen to contain a group of seven portraits of members of the artist's family, the likenesses being admirably distinct. Another microscopic photograph, of still less size, represented a mural tablet, erected to the memory of William Sturgeon, the electrician, by his Manchester friends. This little table covered only 1-900th part of a superficial inch, and contained 680 letters, every one of which could be distinctly seen by the aid of the microscope.

The Reading Bricks of Babylon—According to the Leeds (English) *Mercury*, Col. Rawlinson has just discovered among the ruins of ancient Babylon an extensive library—not, indeed, printed on paper, but impressed on baked bricks—containing many and voluminous treatises on astronomy, mathematics, ethnology, and several other most important branches of knowledge. These treatises contain facts and arguments, which, in his opinion, will have no small effect on the study of the sciences to which they relate, and, indeed, on almost every branch of learning, and which throw great light upon Biblical history and criticism, and the history of our race.

Machinists in Cuba.

During the sugar cane season in Cuba, say from November to April, there are usually employed on the various plantations about twelve hundred machinists as engineers and repairers. Few of these machinists are Cubans, and few of them remain the whole year on the island. A large number are Scotchmen, a few English, while the United States furnish a large share. These machinists repair to the island during the month of October, and secure situations usually at most excellent wages, and then remain until May, when they leave the island and spend the warmest weather in a more healthy climate. Not a few have families who remain in the United States. For years the demand for machinists in our own country has been so great, and the prices paid for labor so good, that the higher rates paid in Cuba have no been sufficient to entice very many to so warm and unhealthy a climate. There are some twenty or thirty residing in South Boston, however, who have every year for several years visited Cuba, and spent the working season.—[Boston Traveller.

Singular Cause of Leak in a Vessel.

The schooner *Shooting Star*, of Gloucester Mass., was recently taken upon a marine railway at that place for the purpose of discovering the cause of a considerable leak in her bottom, when a piece about one foot long and eight inches wide was found to be worn as thin as a wafer. On removing the damaged plank, originally two inches thick, two pebble stones, rather larger than a hen's egg were found, and their constant rolling with the motion of the vessel had thus nearly worn through the thick oak plank when they were fortunately discovered.

This simple cause of leakage—two pebbles—might have been the means of sinking this vessel in the ocean. Small dangers should never be overlooked nor despised.

Military Uses of the Daguerreotype.

The Glasgow (Scotland) *Herald* states that the commander of the British militia troops in Lanarkshire having lost a considerable number of men from desertion—the majority of whom make their way to Glasgow, after they have received part of their bounty and necessaries—has hit upon a capital auxiliary to identification. So soon as they are clothed, the likenesses of the men are taken by daguerreotype in groups of half a dozen, upon one plate; the picture is fidelity itself. When a man disappears from Lanark, therefore, the plate upon which his physog is imprinted is sent down to Glasgow, where it is shown to the recruiting serjeants for the regiment, who, having the portraits in their remembrance, can look after the man as if he had been an old acquaintance.

Uses of the Telegraph.

The electric telegraph is becoming more and more useful. A peasant received lately, by mail, a letter from his son Joseph, a Zouave before Sevastopol. The young man mentioned the fact that his legs were yet whole, but that his shoes were the worse for wear. The affectionate father having purchased a pair of nine-and-a-halfs, was perplexed as to the means of forwarding them. At last he thought of the telegraph—the line to Marseilles ran through his village. He put the address on one of the soles and slung the shoes over the wire. A pedlar passing by, struck by the solidity of their workmanship, appropriated them, placing his used-up trampers in their place. The next morning the old daddy returned to the spot to see if the telegraph had executed his commission. He saw the substitution which had been effected. "I vow," he exclaimed, "if Joseph hasn't already sent back his old ones!"—[Paris correspondent N. Y. Times.

Atmospheric Air Necessary for Decomposition.

The presence of atmospheric air or oxygen appears essential to the first development, if not to the continuance of nearly all of decomposition. Meat, vegetables, and indeed most organic substances can be kept from the atmosphere for years. Eggs lose their property of absorbing oxygen by immersion in milk of lime; the small amount of carbonic acid contained within the shell uniting with the solution of lime that penetrates into the pores of the shell, and forming an insoluble carbonate, choking up all the apertures by which air can enter. Eggs have been found sweet after being kept in this manner over three years. Wood sunk several feet beneath the surface of the peat bog is preserved from decay, the oxygen absorbed by the organic matter above it not being able to reach it.

Newspapers in the World.

The following is supposed to be the number of newspapers in the world: 10 in Austria; 14 in Africa; 24 in Spain; 26 in Portugal; 30 in Asia; 65 in Belgium; 85 in Denmark; 50 in Russia and Poland; 350 in other Germanic States; 500 in Great Britain and Ireland; and 2,000 in the United States, or nearly twice as many as in all other nations.