Soluble Glass.

MESSRS. EDITORS—My attention was drawn to the communication in No. 14, present volume, of your valuable journal, signed E. W. D., in which your correspondent declares that soluble glass did not answer the purposes described in my letter of November 6th. Having some reputation at stake, and feeling a pride in having (more than twenty-five years ago) introduced this article into the United States, I consider myself bound to reply and refute the objections of your correspondent. I would give him the classical advice, "*experientia docet*," and advise him to continue his experiments a little longer, for the world was not made in a day, and E. W. D. must not hope to realize all his expectations at once, or make his fortune by the outlay of $1 50. The first gallon, it would seem, has failed with him, as might any protective varnish or cement, when used merely as an experiment. He should give it a fair trial before he pronounces such a total condemnation. In support of my position, let me refer him to pages 245 and 246, Vol. 4, of Dr. Muspratt's Applied Chemistry, and for his information I will quote a few passages. After remarking that soluble glass has been applied to several important purposes, among which he enumerates the protecting of building stones from decay, and the hardening of cements and mortars to render them impermeable to water, he says :—

"The stone surfaces of buildings, by being exposed to the action of the atmosphere, become liable to disintegration from various causes. Moisture is absorbed into their pores. The tendency of their particles to separate in consequence of expansion and contraction, produced by alternation of temperature, is thus increased. Sulphurous acid is always present in the atmosphere of coal-burning cities, and cannot but corrode the calcareous and magnesian ingredients of oolites and dolomites. As a preventive of destruction, whether arising from physical or chemical causes, it has been proposed to saturate the surface of the stones with a solution of water glass.

It is well known that the affinity of silica for alkali is so feeble, that it may be so separated from this base by the weakest acids, even by carbonic acid. According to the expectation of those who recommend the silification of stone, the carbonic acid of the atmosphere will set the silica inse from the water glass, and the silica thus separated will be deposited within the pores and around the particles of the stone. The points of contact of these particles will thus be enlarged, and a sort of glazing of insoluble silica will be formed sufficient to protect the stone from the effects of moisture, *et cetera*. This cause of protection applies chiefly to sandstones; but wherever carbonate of lime or carbonate of magnesia enters notably into the composition of the building stone, then an additional chemical action, also sheltering the stone, is expected to take place between these carbonates and the water glass. An insoluble salt of lime may be looked for whenever a solution of water glass is made to act on the carbonates of lime or magnesia existing in oolitic or dolomitic building stones."

He further states that M. Anthon, of Prague, proposed to render mortars waterproof, and to supply soluble glass as a substitute for size in whitewashing and staining walls :—

"It was demonstrated by several experiments, that carbonate of lime, mixed up with a weak solution of water glass, and applied as a whitewash to surfaces, was not washed off by sponging with water; and that common whitewash, laid on in the usual manner with size, was rendered equally adhesive when washed over with water glass."

A patent was granted in England not long ago, for the preservation of stone by means of soluble glass, which consists in the application of chloride of calcium on the stone, and subsequently the soluble glass; this will bear out the editorial remarks affixed to the communication of E. W. D. I will tell him that wood can be made to such an extent proof against fires; that timber, shingles, cars, machine shops, or any other structure exposed to sparks, when coated with a paint composed of plaster of Paris, whiting, oxyd of manganese or soapstone, in combination with the soluble glass, will not take fire. A cement for covering wooden or tin roofs, which becomes as hard as iron, may be made from a composition of ground fluorspar, plaster of Paris, clay, and sand, formed into a plastic mass with soluble glass. The soluble glass forms a most valuable admixture to manure the grape vine, and it is most extensively used for that purpose in France. The soluble glass is a most powerful detergent, and if used in place of soap, has a wonderful effect upon clothes, and saves the washboard to a great extent; and when in combination with chlorine, produces the best bleaching and disinfecting, as well as cleansing substance.

If your correspondent wishes to be better informed on the multifarious useful applications of soluble glass, I will cheerfully communicate with him. F.

Wood Bearings for Shafts—Lubrication.

We have on a former occasion—on page 330, Volume XI., SCIENTIFIC AMERICAN—directed attention to this subject, but we find something new and useful relating to it, and well worthy of notice, in the last number of *Newton's London Journal*. The article is a report of a paper read by John Penn, Esq., before the Institution of Mechanical Engineers in London, of which he is president. At the meeting he exhibited specimens of *lignum vitæ* bearings, which had been used for the propeller shaft of the *Malacca*, a steam sloop-of-war, and although they had been in use three and a half years, and had run 75,000 miles, yet they exhibited scarcely any signs of wear. Brass bearings frequently required repair after a run of 2,000 miles. The weight on these bearings had been about 70 pounds on the square inch, but they could stand a pressure of 700 pounds. In wooden ships, like those of war vessels, iron shafting with brass bearings soon became rough, which effect is attributed to a galvanic action through the copper sheathing, but whether this is the cause or not, wooden bearings were free from such action, and they were found to be the most durable for the propeller shafts of both timber and iron vessels,

Experiments had been made to test the effects of oil and water as lubricating agents with brass and wooden bearings. With brass, and oil as a lubricator, and a pressure per square inch of 448 pounds, the engine had to be stopped in three and a half hours running, with its shaft nearly red hot; under the same pressure with water as a lubricator, the engine run five hours, but the bearings were considerably cut. With *lignum vitæ* wood bearings, and oil as a lubricator, under similar pressure, the wood was charred and crushed in ten minutes. With water as a lubricator, the pressure was raised to 2,688 pounds on the square inch, and the vessel ran nearly five hours without any perceptible wear of the wood, thus proving the superiority of water as a lubricator with wooden bearings. Such bearings for shafting are older than those of metal, but they had entirely gone out of use in steam machinery, and never had been applied in steamships. We now witness a revival of their application with very economical results, every screw propeller in the British navy having been fitted with them during the past three years, and they have been found ten times better than metal bearings. The wood is placed in strips, in slots made in brass boxes, so as to sustain and bear the rubbing of the shaft, in the same manner that soft metal composition bearings in iron boxes were first used in our country, by Mr. Ayres, engineer, of this city.

The Weighing of Coal.

The *Philadelphia Ledger* of the 16th inst., as usual, contains some very judicious remarks on this subject. It advocates the justice of demanding dealers to weigh their coal at the doors of their customers. It states that the coal dealers of that city are opposed —not much to their credit—to the use of self-weighing carts.

The New American Cyclopædia.

This valuable work has reached its fourth volume; and the publishers, Messrs. D. Appleton & Co., may congratulate themselves upon having secured the services of such eminent writers as contribute to its pages. To give our readers a better idea of the work than any criticism or notice could, we have selected a few articles full of information from the published volumes, and from them an idea can be obtained of the character of the work :—

WILLIAM BEAUMONT—A surgeon in the U. S. Army, born in 1796, and died at St. Louis, April 25, 1853. He is principally noted for his discoveries regarding the laws of digestion, and for his experiments upon the body of Alexis St. Martin. In 1822, beaumont was stationed at Michilimackinac, Mich. On June 6th, St. martin, a young man eighteen years of age, in the service of the American Fur Company, was accidentally shot, receiving the whole charge of a musket in his left side, from a distance of about one yard, carrying with it portions of his clothing, and fracturing two ribs, lacerating the lungs, and entering the stomach. Notwithstanding the severity of the wound, Dr. Beaumont undertook his cure, and by careful and constant treatment and attention, the following year found him enjoying good health, with his former strength and spirits. In 1825, Dr. Beaumont commenced a series of experiments upon the stomach of St. Martin, showing its operations, secretions, the action of the gastric juices, &c.: these experiments he was obliged to discontinue after a few months, but renewed them at various intervals until his death; his patient during so many years presenting the remarkable spectacle of a man enjoying good health, appetite, and spirits, with an aperture opening into his stomach two and one-half inches in circumference, through which the whole action of the stomach might be observed. The result of his experiments was published by Dr. Beaumont in 1833, and has been recognized throughout the medical world as a valuable addition to science. St. Martin is still living, having visited Europe in 1857.

AROMA—The principle in plants or other substances which constitutes their fragrance. In some plants this resides in a volatile oil, but in others the portion containing this principle cannot be detected. It is of an extremely subtle nature, filling the air of rooms, or even the whole atmosphere around gardens; and though constantly imparted, as it may be, for instance, in the case of musk, for years, so as constantly to fill the air of a well-ventilated room, yet never causing to the substance from which it comes any diminution of weight. The aroma of plants is imparted to oils by maceration, but not to water.

ACTINISM—The peculiar property or force of that portion of the sun's rays which produce the chemical effects shown in photography, and also the effect of causing the seeds of plants to germinate. That the actinic rays are different from those which produce heat and light, was shown as far back as 1842 by Professor J. W. Draper, of New York, who recognized in them a new principle or force, for which he proposed the name of *tithonicity*, and for the rays that of *tithonic*. The name now adopted was given by Mr. R. Hunt, of England. It is found that actinism does not exist in the most luminous rays of light, and that these rays actually tend to prevent the peculiar effects of this force upon inorganic matter. The quantity of actinism in the sun's rays varies with the time of the day, and with the seasons. Its deficiency in the tropics renders it difficult to obtain good pictures there. Its greater abundance in the spring of the year causes this to be the best period for taking pictures, as it is the season for the germination of seeds and the opening buds. This principle is obstructed by the passage of rays of light through yellow glass. Hence the unsuitableness of this glass for greenhouses.

ABERRATION OF LIGHT—The alteration of apparent position in a heavenly body, due to the fact that the observer on the earth is in motion. When a train of cars is running east during a northerly wind, the wind appears to come from the east of north, and more easterly in proportion to the speed of the train. In like manner, the light from a star appears to come from a point slightly nearer the point towards which the earth chances to be moving, and we see no star in its true place, unless we are moving directly towards or from the star. This causes the star to have a slight annual motion, describing usually a minute eclipse in the sky. The aberration of light, discovered by Bradley, is a beautiful proof of the motion of light, and of the earth's motion. The longest diameter of the minute ellipses of aberration is about one-fortieth the diameter of the moon.

ANILINE—One of the numerous products of the distillation of coal-tar, obtained in the form of a clear oily fluid from the oil of the tar by adding chlorohydric acid, heating and distilling, lime or an alkali being added to retain the acid. The product is redistilled and purified by repeating the process until an oil is obtained, the boiling point of which is 360° Fah., and this is then further purified by heating with oxalic acid and adding potash to form the oxalate of potash. It is also obtained by distilling nitro-benzole and other analogous compounds of carbon, hydrogen, and nitrogen; and lastly, by heating isatine with potash. Isatine is a product of the action of nitric acid upon indigo, whence the name, aniline, was given by Dr. Hoffman, of London, who discovered this substance, from the Spanish *anil*, indigo. The composition of aniline is thus represented: $C_{12} H^7 N$. Its specific gravity is 1·02; its boiling point 320°, and it does not freeze at —4°. It possesses an aromatic taste and a vinous odor, is very volatile, its vapor being of a brown color. Sulphur, camphor, resin, &c., are dissolved by it; with acids it forms crystalline salts. Its presence is detected by the fine violet blue color produced in a solution of chloride of lime, by adding minute quantities of it. This beautiful blue color is produced also by other similar products of coal-tar, as well as by those of indigo; and the principle which causes it is, probably, the same in both. It is, therefore, not unlikely that coal-tar may be hereafter relied upon to furnish the materials for this color, as also the beautiful red and yellow now produced by madder.

BLACK COPPER—The crude metal produced by the first smelting of copper ores, and which requires subsequent melting and refining to convert it into merchantable copper. It is sometimes conveniently and rudely prepared in cheap furnaces near the copper mines, as the easiest method of concentrating the metallic portions of the ore, and reducing the cost of transportation to distant markets. It generally contains from 70 to 95 per cent of copper, mechanically mixed with metallic iron and a small proportion of other foreign matters.

ÆTHER—A subtile medium much rarer and finer than air, which the ancients believed to pervade space above and beyond the region of the heavy earthy air. The gods above breathed the æther as they lived on ambrosia and nectar, things purer and sweeter than ordinary terrestrial food. It was sometimes personified. Descartes and Sir Isaac Newton both believed in the existence of such spiritual media pervading space.