Architects' Trials and Tribulations.

A writer in the *American Architect* relates the common experience and trials of architects with their customers as follows:

What architect has not had clients who came to him with a painfully elaborated impossible sketch, saying, "Now, this is about my idea of a house. I wish you would make me a design that would embody it in a practical form." The architect takes such a sketch and remodels it, endeavoring to satisfy all the requirements, and making of it, in the end, a creation entirely his own, which he presents to his client, who exclaims almost invariably, "Why, how simple! any one could have done that!" and makes up his mind that architecture is a very easy business. Or, again, an architect inquires about some work that excites his interest or admiration, as having architectural merit, and is answered, "Well, Mr. So-and-so was our architect, but we really did not need him; my wife was the real designer, and the good points of the house are all her ideas." Of course it is not pleasant to have one's thunder stolen in such a manner, and the unfortunate architect who has twisted and turned his plans and put one tracing over another, in trying to reconcile the ideas of his client's wife with themselves, with each other, and with his design, is tempted to vow that in future he will reject, on principle, all ideas brought forward by his client's wife or any of his female relatives; or—a more dreadful vengeance still—that he will let madam design the house herself. It is the only redress he can hope for, as, when such a version of his services is given, it is more generally believed than would seem possible, in view of its improbability, and he has few opportunities to justify himself.

But there are other instances where architects are subjected to more serious wrongs and annoyances, and which are seemingly as difficult of redress. An architect is invited, for instance, together with a number of other architects, to submit designs for some large building; the architect whose design proves the most acceptable to the owner or client is to be appointed architect of the building, and to carry out his design; the other competitors are to be paid a fixed sum, avowedly based, under the most liberal arrangements usually made, upon the amount of time and labor required to produce the drawings. In due time the designs are submitted to the owner, or his representatives, one of them is selected, and its author appointed architect, the other designs being returned to their authors, with the stipulated compensation. So far our architect, whom we will suppose to be one of the unsuccessful competitors, has nothing to complain of, unless, indeed, he has reason to believe that other considerations than the competence of the competitors and the merits of their design were allowed to influence the choice of the owner, a contingency which we will not consider here. The building goes on, and our architect returns to his own affairs, but discovers, during or after the erection of the building, that certain essential features, which at the time of the competition only appeared in his drawings, have been embodied in the new building. Now, what position can he take in the matter? Has he a right to feel that he has been defrauded, and if so, who has defrauded him, and what redress can he obtain?

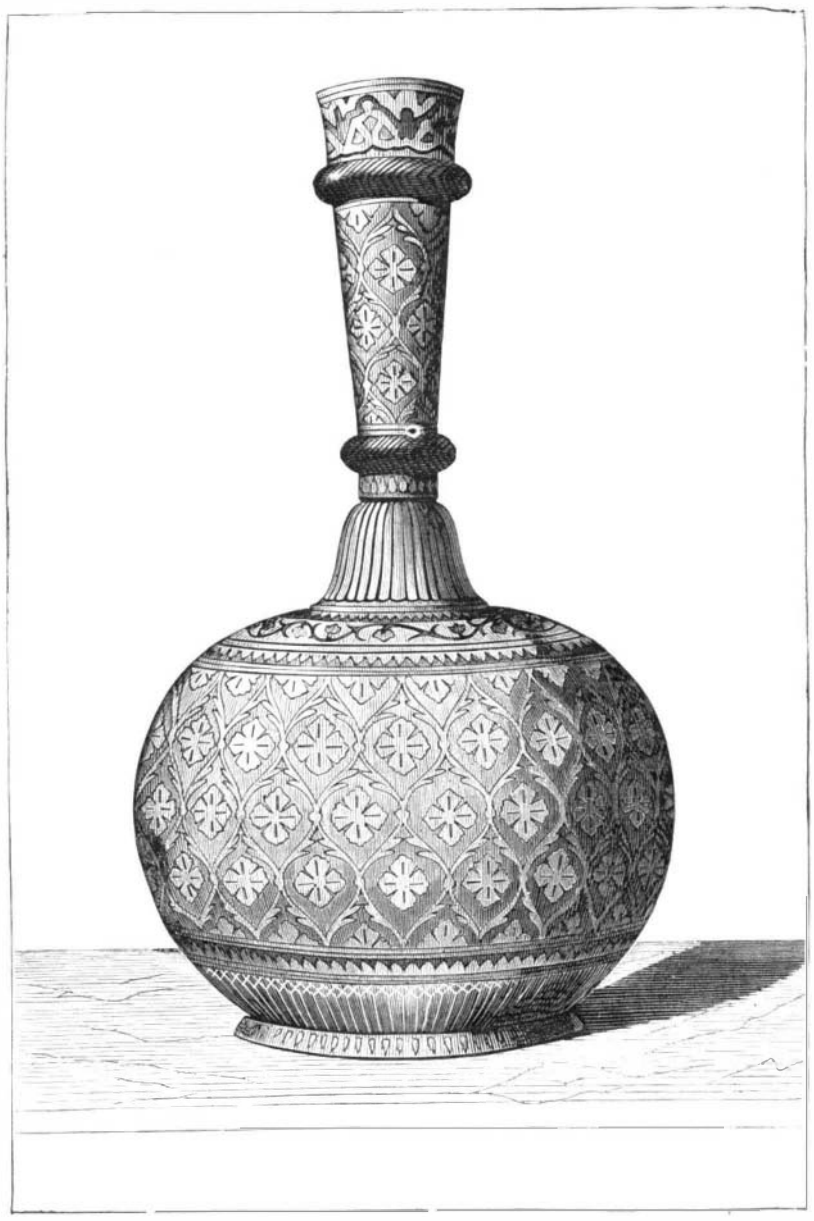
Beer Drinking in the United States.

For some years past a decided inclination has been apparent all over the country to give up the use of whisky and other strong alcohols, using as a substitute, beer and bitters and other compounds. This is evidently founded on the idea that beer is not harmful and contains a large amount of nutriment; also that bitters may have some medicinal quality, which will neutralize the alcohol it conceals, etc. These theories are without confirmation in the observations of physicians and chemists where either has been used for any length of time. The constant use of beer is found to produce a species of degeneration of all the organism, profound and deceptive. Fatty deposits, diminished circulation, conditions of congestion, and perversion of functional activities, local inflammations of both the liver and kidneys, are constantly present. Intellectually, a stupor amounting almost to paralysis arrests the reason, precipitating all the higher faculties into a mere animalism; sensual, selfish, sluggish, varied only with paroxysms of anger, that are senseless and brutal; in appearance the beer-drinker may be the picture of health, but in reality he is most incapable of resisting disease. A slight injury, severe cold, or shock to the body or mind, will commonly provoke acute disease, ending fatally. Compared with inebriates, who use different forms of alcohol, he is more incurable, and more generally diseased. The constant use of beer every day gives the system no time for recuperation, but steadily lowers the vital forces, it is our observation that beer-drinking in this country produces the very lowest forms of inebriety, closely allied to criminal insanity. The most dangerous class of tramps and ruffians in our large cities are beer drinkers. It is asserted by competent authority that the evils of heredity are more positive in this class than from alcoholics. If these facts are well founded, the recourse to beer as a substitute for alcohol, merely increases the danger and fatality following.

In bitters we have a drink which can never become general; but its chief danger will be in strengthening the disordered cravings, which later will develop a positive disease. Public sentiment and legislation should comprehend that all forms of alcohol are more or less dangerous when used steadily; and all persons who use them in this way should come under sanitary and legislative control.—*Quarterly Journal of Inebriety.*

SILVER WATER BOTTLE.

The engraving on this page represents a solid silver water bottle of rare beauty, engraved by native Indian designers, who follow with great strictness the canon of art which has obtained for centuries; only too often misapplied by our own workmen in their endeavors to improve upon foreign styles of art, without understanding their principles.



ENGRAVED SILVER WATER BOTTLE.

The Coliseum Drained.

The stagnant water which has been suffered for years to accumulate and breed fevers and frogs in the Coliseum at Rome, has been drained off at last. An ancient sewer, extending from the *meta sudans* to the Tiber, was discovered, and was connected with a drain from the Coliseum. The water was admitted into this ancient sewer on the 3d of March, and the flood which filled the basement story of the famous amphitheater of Flavius was gradually drawn off. In cleansing the sewer there were found a quantity of ancient lamps with gladiatorial ornamentation, human skulls, and bones of animals. Much of the old Roman road in the Foro Romano is now exposed to view, and the ruins of the shops of the goldsmiths and silversmiths are visible.

Waterproofing of Cotton and Linen Fabrics.

The recipe for "waterproofing" stout calico, used by the Chinese, and which is perfectly efficient, alike in the hottest and coldest climates, is believed to be composed of boiled oil, one quart, soft soap, one ounce, and beeswax, one ounce; the whole boiled until reduced to three quarters of its previous quantity; but experiments are required to satisfactorily test the above proportions; paint soon cracks, and ceases to be impervious to water. The addition to the boiled oil preparation of some ingredient which would prevent all risk of spontaneous combustion, when bales of oiled goods are sent abroad, would be advantageous; but no objection on this account applies to the supply of waterproof sheets (prepared with boiled oil, etc.) for use in ships, as only those that are in the hammocks would be coated, and with them there would be no more risk than is incurred with the seamen's waterproof jackets; the small spare supply would be harmless calico sheets, not to be waterproofed until required.

The recipe used by Mr. Berthon to render the canvas of his collapsing boats airproof and waterproof, and believed to be similar to that used in the British dockyards for hammock cloths, is as follows: To 6 oz. of hard yellow soap add 1½ pint of water, and when boiling, add 5 lb. of ground spruce ocher, ½ lb. patent driers, and 5 lb. of boiled linseed oil.

For waterproofing sheets, the ocher should be omitted, as it adds to the weight, lessens the flexibility, and is unnecessary.

Japanese Bronzes.

Mr. Consul Flowers, in a report on the commerce of Hiogo and Osaka, Japan, lately issued by the Foreign Office, thus speaks of the manufacture of Japanese bronzes: "The moulds, which of course vary according to the shape of the vase or bowl it is desired to make, are made of wood, sometimes covered with straw. On this a coating of clay is placed; over this comes a layer of wax, which is moulded into the design required. Another thick coating of clay is then added, and the inner wooden mould being taken out the orifice at each end is closed. Two holes are then made at one end connecting with the layer of wax, so as to enable the wax, when melted, to run out, and through these the molten bronze enters, filling the interstices occupied by the wax. The subsequent process of casting is of the rudest kind. The earthen mould is placed in a small clay oven hollowed out in the floor of the workshop, the sizeof which depends upon that of the casting. The oven is then filled with charcoal and closed, with the exception of a circular opening at the top, on which a chimney, a foot or so high, is built of wet clay. The oven is connected underground with a wooden bellows, protected from the sparks and heat from the furnace by a small earthen or stone wall a foot high, and which is worked by hands and feet. The first operation is to melt the wax, which runs out, leaving the impression of the design stamped firmly in the surrounding layer of clay. This done, the mould is taken out and allowed to cool. It is then put a second time into the furnace as before, and the molten bronze is then poured into the mould through the holes by which the wax escaped. After the bronze has filled the mould the chimney is knocked off, the oven supplied with fresh charcoallaid evenly around the mould, and a lid being put on the oven, furnished with small perforated holes, the bellows are set to work again for an hour or more, according to the size of the casting taken. This operation generally occupies a day. When the casting is taken out of the oven, the earth outside and inside is scraped off, and reveals the vase or bowl in a rough state. It is then put into the hands of rude workmen, boys being mostly employed in this part of the work, by whom it is polished and scraped with a knife until it presents a smooth surface. It then passes on to the carver, who fills in the details of the designs. When his work is done the vase or bowl is dipped into a boiling solution of vinegar, sedge, and sulphate of copper, in order to give it the proper color. A few finishing touches in the way of polish are added, and the article is finished and ready for sale."

Simultaneous Inventions.

We have repeatedly alluded to the singular fact, from our own observation, of persons residing in remote places from each other making the same invention about the same time. The *New England Journal of Education* mentions a new case of the simultaneous appearance of the same invention as follows:

"The application of the methods of ordinary writing to telegraphic communications has been a matter of long study and experiment, but hitherto without success. We were shown on Saturday, March 22, at our office, a simple contrivance, invented by Professor Dolbear, of Tufts College, Somerville, Mass., by means of which the handwriting of the operator may be transmitted with the record of the message to the office to which it is sent. Singularly enough, on February 26, 1879, Mr E. A. Cowper, of London, exhibited in operation, before the Society of Telegraph Engineers, in that city, a writing telegraph, constructed on the same principle as that of Professor Dolbear; and from the drawings in the SCIENTIFIC AMERICAN of March 29, one would suppose the instruments identical. The achievement is a valuable one, and both parties are worthy of highest credit as inventors."

DR. JAMES FREEMAN CLARKE recently delivered a discourse on the Chinese question, in which he very quaintly and truly said that in America, if a man is black we enslave him; if he is red we steal his lands and massacre his wife and children, and if he is yellow we won't let him come here at all.

Isinglass from Seaweeds.

A very interesting product, called "kanten," or vegetable isinglass—a species of gelose derived from either of the seaweeds *Gelidium corneum* or *Plocaria lichenoides*—is made in China and Japan, and exported to Europe in flat and moulded tablets and in bundles of strips. It is known in Cochin China as "hai thao," and is used in France in several industries, especially in the preparation of gold beater's skin, and for rendering tissues impermeable. It is soluble in boiling water only, of which it takes up about 500 times its weight. It is manufactured as follows:

The seaweed, called by the native name of "tengusa," is carefully washed and afterward boiled, so as to form a gluish decoction, which is strained off and put into square boxes. When cool it forms a stiff jelly, which can easily be divided into squares a foot in length. The manner in which the surplus water is removed is very ingenious. The jelly prisms are exposed in the open air during a cold night and allowed to freeze. During the day the sun melts the water, which runs off, leaving behind what one might term the skeleton of white horny substance, which is extremely light and easily dissolved in hot water; when cooled, it again forms a stiff jelly. This article can be applied to many purposes—for culinary uses, for making bonbons and jellies, for clarifying liquids, as a substitute for animal isinglass, for making moulds used by the plaster of Paris workers, for hardening the same materials—in short, as a substitute for all kinds of gelatines, over which it has the advantage of producing a firmer jelly. Another seaweed much used for industrial purposes is the "fu," resembling carrageen or Irish moss, and applied to similar uses, such, for instance, as the sizing of the warp of silk goods. Recently the manufacture of an isinglass of this kind has sprung up in France, being made from the seaweeds found on the coast of that country. In its crude state it is a yellowish gelatine, but after repeated experiments under the auspices of the Industrial Society of Rouen it has been successfully converted into what bids fair to prove the best sizing for cotton cloth known, and will probably entirely supersede the Asiatic product. Macerated in water for twelve hours, boiled for fifteen minutes, and stirred till it becomes cold, the article gives a clear solution, which, as it does not again become a jelly, can be laid in its cold state upon any textile fabric and be left to dry. One invaluable property it possesses is that of defying at common temperatures damp and mildew; and is, therefore, being applied to give a luster not only to French prints and muslins, but also to woolens and silks.

In China the first quality of the seaweed isinglass is used in a number of industries, especially in stiffening light and transparent gauzes, and the fine silk which is used for making fans, screens, hangings, etc. It is on these stuffs, so well stiffened, that the artists produce such beautiful designs in colors, incomparable for their freshness and brilliancy. A second quality of the article, of darker tint, is used by the makers of paper umbrellas and parasols and paper lanterns, to smear the fine stretchers of bamboo on which they are formed. When thoroughly dried these articles of such extensive use acquire an impermeability of long duration.

The Utilization of Sulphides as Fuel in Metallurgy.

A new application of a process of rapid oxidation, by means of which sulphides are used as fuel, and which promises apparently to become of considerable importance in metallurgical operations on a large scale, has recently been brought to the attention of the Society of Arts by Mr. John Holloway.

The new process is based on the following data: The combinations which go to make up the solid crust of the earth consist, as is well known, of compounds of the elementary bodies with oxygen, and compounds of the elementary bodies with sulphur. Thus, for instance, iron combined with oxygen, forming oxide of iron, occurs in almost all rocks and forms vast deposits in many parts of the world. The same metal, mineralized by sulphur in sulphide of iron, known as iron pyrites, is one of the most widely distributed and abundant of natural minerals. Copper, lead, and zinc are likewise found as oxides and sulphides, and it is from these natural combinations that is extracted the whole of these metals, artificially produced. It is in one or the other of these two forms that the more common metals occur in nature.

In the present processes for extracting metals from their ores the requisite heat is always obtained by the burning of coal, coke, or other form of carbon. Mr. Holloway reminds us, however, that the sulphides can be made to burn in the air, and thus are truly combustible substances, while the oxides, on the contrary, are bodies that have already been "burnt." The metallic sulphides are consequently natural combustible minerals; in fact the largest deposits of coal existing in various parts of the world are, perhaps, more than rivaled as sources of latent heat by these natural sulphides, abundant in every country and occurring in almost every vein in the earth's crust. It was the author's object to prove that these minerals can be utilized as sources of heat in certain metallurgical operations. On account of the frequency of its occurrence, and the extent of its deposits, pyrites rank as the most important of the metallic sulphides. The principal constituent in this mineral in bisulphide of iron, with which are frequently associated sulphides of copper and arsenic; silver and gold, too, being often present in larger or smaller quantities.

When iron pyrites are roasted in the open air, an increase of temperature takes place in its mass, so that the oxidation proceeds without the continuation of external heat. The other principal sulphides are those of copper, lead, zinc, and antimony. Sulphureted ores of copper, lead, and zinc are usually roasted to render them reducible in the furnace, the necessary heat being always obtained by the combustion of coal or similar organic material. This roasting process extends over a considerable space of time, and the sulphur and metals frequently burn to waste, because the utilization of the heat resulting from the burning of such fuel has not hitherto been considered of much importance. From data obtained by calculating the comparative temperatures produced by the oxidation of the principal sulphides, Mr. Holloway was led to believe that during this oxidation sufficient heat was produced to render the smelting of the sulphides a self-supporting operation. Instead, therefore, of allowing the roasting of the pyrites to proceed in the usual slow manner, in which all the heat developed is lost, he proposes, after starting the oxidizing process by means of extraneous heat, to force a rapid current of air through the molten sulphide. By this means, he claims that the whole of the oxygen of the air is abstracted while passing through, and that the elevated temperature obtained by the quickened oxidation accomplishes in a few minutes what, in the case of copper pyrites, takes many months to do.

In several preliminary experiments, in which large quantities of pyrites were treated in a Bessemer converter, it was found that the pyrites could be melted by the heat evolved by its oxidation, and that the heat developed was sufficient to render the operation continuous. Full details of each experiment are submitted in Mr. Holloway's lengthy paper read before the Society of Arts; and the results of the experiments themselves, which were witnessed by many of the most prominent chemists of England and France, seem to promise an approaching revolution in the methods heretofore employed in certain smelting operations.

Silver Reduction in Colorado.

Mr. J. K. Hallowell gives in the Kansas City *Review* the following interesting account of the silver reduction works at Pueblo, Colorado:

The town (5,500 population) is garnished with a well-built court house and school houses, and is furnished with waterworks—the Holly system—while the fine brick residences on the surrounding mesa add materially to its substantial appearance. The place of most interest to me was the silver reduction works of Messrs. Mather & Geist, situated quite near the railroad cut. The chimney of the works is built on top of a hill, and the building containing the furnaces near the bottom; a long flue running up the hillside connects the two, and the distance is such that most of the vaporized precious metal is deposited and saved within it, while otherwise it would be lost. There are three furnaces, capable of reducing seventy-five tons of ore per twenty-four hours, each furnace running from eight to ten weeks before choking up; this is owing to the suitable character of the flues used and the care taken in keeping up an even temperature. Each furnace is square in shape, with two openings for running off the slag, and two more smaller through which the metal is continually emerging into a small pot built into the brickwork, and from there ladled into iron moulds containing about 150 lbs. each, and shaped very much like bars of pig iron. In this condition it is called base bullion, and is ready for shipment East, where it can be still further reduced more economically. The slag is drawn off into large iron pots mounted on wheels, and when cool enough is wheeled into the yard, dumped, and broken up, quite a large button of metal settling at the bottom, which is saved to go again through the furnaces. The coke comes from Trinidad, Col., the iron ore flux from Garland, while the limestone used is obtained about four miles up the river, where it is loaded direct on the cars from the quarry, the Narrow Gauge road having a switch track to the works, as does also the Atchison, Topeka, and Santa Fé Railroad, standard gauge, making railroad communication with the whole country. I was somewhat surprised to learn that Cañon City coals would not coke, while those from the north contain too much sulphur to be as good for smelting purposes as the coke obtained from Trinidad. The ores used are shipped from Rosita, Col., and Leadville, consisting of argentiferous galena from the "Ben Franklin" mines, some carbonates from the "Bassick" of the first place, and all carbonates from the latter. The Rosita ores are hauled to the works in wagons; the Leadville ores are hauled to Alamosa, Cañon City, and Colorado Springs, and from there shipped by rail. Of the Leadville carbonate—well, I have seen many clay banks that looked as rich, although there is a perceptible difference in the specific gravity; in color they resemble the clay banks of Kansas City, while the "Bassick" ore was a light yellow and much richer in "pay." The ores are shipped in sacks weighing from 70 to 150 lbs. Some is received in bulk from Leadville at present, the quantity taken out being greater than can be properly packed; to this there must be some waste in the long haul by wagons, and where, of course, a saving will be effected in time.

It is a real pleasure to visit works conducted as these are. Although many men are employed, there is no confusion or noise. Each man appears to understand his duty and does it. The proprietors give personal supervision to everything, and as I watched the men carrying sacks of ore into the building, previous to weighing, I heard the manager cautioning the men to be careful in handling some sacks in which small holes were worn, that no ore might be wasted. It is such close and careful attention to the interests of their customers as this that is giving these works an enviable reputation among mine owners; for, as near as I could understand it, the smelting furnace stands in the same relation to the miner that the grist mill does to the farmer, and is conducted on much the same basis. As the ore is received after weighing, an average assay is made; a deduction of ten per cent made for loss, or difference between assay returns and actual working product. A charge of $30 per ton is made for reducing, and the balance paid the shipper at once, the price being based on the price of silver per ounce on that day.

A New Great Gun.

The British War Office has been invited by Herr Krupp to send representatives to be present at the trials of a new steel gun of extraordinary size, to take place at Meppen, in Westphalia. The invitation has been accepted by the War Office, which will be represented by two officers deputed for that purpose. The gun to be experimented with on this occasion is the largest specimen of steel ordnance yet made. It weighs 72 tons, with a caliber of 40 centimeters, or 15¾ inches. The length of the gun is 32 feet 8 inches, and that of the bore 28 feet 6 inches. The English 80 ton gun has a caliber of 16 inches, a total length of 27 feet, and a bore 24 feet long. The superior length of bore in the Krupp gun is thus apparent, being 21¾ calibers, as against 18 calibers in the English gun. The material of which the Krupp gun is composed is steel throughout. The core of the gun consists of a tube running its entire length, as in the Woolwich gun, but open at the rear, the loading being at the breech instead of the muzzle. The tube of this large weapon being of such great length it has been made in two portions, the joint being secured in a peculiar manner.

We may observe that a sectional drawing of a Krupp gun is not to be obtained; that the exact mode of building up is not discoverable, except by cutting the gun to pieces. Over the tube are four "jackets," or cylinders, of various lengths, supplemented by a ring over the breech portion. The cylinders are much less massive than in the Fraser gun, and approximate more to the pattern of the Armstrong ordnance. The gun is chambered—that is to say, the powder chamber has a greater diameter than the bore. The form given to the powder prisms, and the adjustment of the cartridge in the bore, allow altogether an amount of space which gives 40 per cent of air to the powder actually composing the charge. The gun is rifled on the polygroove system, with a uniform twist, and the shot is rotated by means of a copper ring let into its circumference near the base. This ring, by filling the grooves of the rifling, also acts as a gas check, and seals the bore from the moment it is rammed into its place, without waiting for any "setting up" by the pressure of the powder gas on igniting the charge. The closing of the breech is effected by means of a sliding wedge, which passes across the bore, and is there fixed. The construction of this wedge is highly ingenious and simple, one feature being that of rendering it impossible to fire the gun until the breech is effectually closed. The wedge is rounded at the back into the form of the letter D, so as to prevent the splitting of the gun by sharp angles. This modification of the wedge has made the Krupp guns much more secure than they were some years ago, when the wedge was made square at the rear.

The charge for this monster gun is to be 385 pounds of prismatic powder, the projectile being a chilled iron shell of 1,660 pounds, with a bursting charge of 22 pounds of powder. It is estimated that the velocity of the projectile as it leaves the muzzle of the gun will be 500 meters, or 1,640 feet per second, corresponding to an energy of very nearly 31,000 foot tons. Calculations have been made for certain distances—namely, at 547 yards a velocity of 1,565 feet, at 1,094 yards a velocity of 1,502 feet, at 1,641 yards a velocity of 1,443 feet, at 2,187 yards a velocity of 1,391 feet, and at 2,734 yards a velocity of 1,345 feet per second. This last range, it will be seen, is equal to 2,500 meters, the other distances given being respectively 500 meters, 1,000, 1,500, and 2,000.

The Meppen shooting ground is admirably adapted for the trial of this great gun, there being an available range of 17,000 meters, or nearly 11 miles, with a breadth of 4,000 meters. It is not likely that the gun will be fired at any great angle of elevation, or even this noble range would be insufficient. It is estimated, rather as a matter of curiosity than otherwise, that if the gun were fired with its axis raised to an angle 43° with the horizon, it would send its projectile to a distance of 15 miles. Great accuracy is also claimed for this weapon, as for all the Krupp breech loading guns. At the forthcoming trials targets will be placed at such a distance that the gun will have to be directed by other means than the visibility of the object to be hit. As may be supposed, the cost of this great steel gun will considerably exceed that of the Fraser gun of 80 tons. The largest steel guns previously made are Krupp's two 56 ton breech loaders, one of which is at Constantinople and the other at Cronstadt.

DR. DRAPER thinks that stupid people may as well stop eating quantities of fish for the purpose of repairing the deficiencies of nature, for it won't make them intellectual. In brief, fish doesn't contain an excess of phosphorus, and when dead fish

> Shine as bright
> As the stars at night,

it positively isn't owing to the presence of phosphorus, but to the oxidation of carbon.