THE PHOTOMETER---LECTURE BY DR. J. OGDEN DOREMUS.

Reported for the New York Tribune.

Prof. J. Ogden Doremus delivered the ninth lecture of the scientific course before the American Institute, January 22, at Steinway Hall. He said:

"In the beginning God created the heavens and the earth, and they were without form and void; and darkness was upon the face of the profound. "What pen shall describe, what tongue shall tell, what human imagination conceive of that tide of glory and splendor which undulated throughout immensity when God said, "Let light be" and light was! Such is the most beautiful and terse description offered in that Word of God which the Christian, as he leaves his anchorage on earth, blesses the Almighty that he can pillow his head upon. To tell the story of the first light which dawned upon the universe of God is beyond the power of man. To tell indeed what has been discovered concerning it would extend beyond the short time allotted to a lecture. That light moves through space with the immense velocity of nearly 200,000 miles in a second of time; that when we look at the sun we gaze at the light that parted from it minutes ago; that when we look at the stars, no one is so near us but that three and a quarter years have elapsed during the passage of that mysterious influence; and when we look up on such a beautiful cloudless night as this evening, and see the magnificent scenery of the heavens, that those worlds send us light which started on its march long before we were born, and, in many cases, ages before our race was existing upon this world—all this is known to modern science. After some further preliminary remarks, Prof. Doremus said that he should not attempt, in this lecture, to discuss these questions, but should come down to three simple points: 1. How do we produce light? 2. Of what is light constituted? 3. How do we measure it? We produce light, first, by the simple production of heat. He illustrated the production of light and heat by various beautiful experiments—burning the metal antimony in chlorine gas, phosphorus with iodine, and in the oxygen of the air; potassium on a piece of ice; zinc in oxygen, and melting and burning iron before the oxyhydrogen blowpipe. The lights thus produced were of different colors, and of great heat and brilliancy. But, said he, it is not enough to produce heat. If the product of the combustion is only gas—as he showed with the flame of a common Bunsen burner—intense heat, but very little light is produced. To change the heat to light, we must have a solid body to give out the light. By heating a bit of lime in common street gas, burned with a jet of oxygen, the brilliant calcium light is produced.

He showed the same light with small pieces of compressed magnesia, heated the same way. He also produced a similar brilliant light by burning the metal magnesium in the air. But, said the lecturer, we can produce light by certain means which far surpasses any of them. He then exhibited the electric light, produced by the aid of a battery of 250 jars, such as are used in our electric telegraphing. By using points of brass, copper, and iron, light of different colors, and degrees of intensity was produced, but with points of charcoal he produced electric light of most dazzling brilliancy, almost equal to the light of the sun. He also showed beautiful revolving lights of different colors, produced by sparks from the electric machine passing through partial vacuums of different gases. He stated several means of measuring light: by means of degrees of heat—its chemical action—or its illuminating power. He exhibited two kinds of photometers for measuring the illuminating power of light—one, that of Bunsen, the one commonly used—and the other a large screen, on which the shadows produced were successively obliterated by the light of a candle. The gas-burner, the Drummond light, the magnesium light, were successively obscured and obliterated, until the more brilliant electric light obliterated them all. The lecture was full of valuable instruction, and his experiments as brilliant and beautiful as his theme. But perhaps the most interesting of all was what he said of the new and cheap method of making oxygen gas by passing superheated steam over manganate of soda, and of the great improvement this will effect in lighting our streets, public buildings, and light-houses. He said that the improvement would effect a saving of 30 to 40 per cent, and would not render the air impure by burning up its oxygen or filling it with noxious gases, and by its harmonious blending of the different colors, would furnish a more beautiful and perfect light resembling that of the sun. It is already used in Paris and soon will be in New York, some of our heaviest capitalists having taken it in hand. With 18 burners lighted in this way, he illuminated the entire hall most brilliantly, the large number of common gas burners paling before it into a sickly yellow light. It was greeted by the delighted audience with the greatest enthusiasm.

NOTES ON THE VELOCIPEDE.

The Commissioners of Prospect Park, Brooklyn, have not only decided to admit velocipedes, but are, we understand, making preparations to afford special facilities for this delightful sport. In regard to schools of instruction in that city, the Brooklyn *Morning Union* of Jan. 20th, says: "The first school for instruction in the art of riding velocipedes had not opened its doors a month before it had to be enlarged, for though commencing with twenty-five pupils, it closed the first month's book with a list of two hundred and twenty-five. Of course another school had to be started, and Pearsall's Twenty-second Street Academy, up town, was followed by Monod's William Street School, down town, the former being crowded at early morning and in the evening, and the latter at spare half hours in the middle of the day. Last night, too, Parker opened a school on Broadway and Forty-ninth street, and the Hanlons open another on eleventh street and Broadway. What New York had Brooklyn must have; and as we found a man who could beat New York fearfully in gymnasiums, we looked to him to whip them in velocipede schools, and our energetic, enterprising townsman, Avon C. Burnham, 'has gone and done it' in his usual masterly style, and now we can crow over having the best velocipede school in the country." It is proposed to use the Clermont Avenue Rink as a great school, as soon as the frost breaks; and it is stated also that the Capitoline, a popular skating park, will also be utilized in this way. So much for Brooklyn, which nobody thought to be a fast place.

The velocipede fever is raging in Massachusetts. A flourishing school exists in Middleboro', and another one is to be opened in Plymouth, where a building recently occupied as a Methodist meeting house is to be fitted up as a rink.

The Cincinnati Velocipede Club have been giving a series of races of which the following is a brief account from the Cincinnati *Commercial*: "The first race was one of a mile in three heats, six runs around the hall being counted one third of a mile. The contestants were Mr. George W. Gosling and Mr. George C. Miller.

"Mr. Gosling lost the first heat by a fall. Mr. Miller made his first third of a mile in one minute and twenty seconds. Mr. Gosling maintained his equilibrium in his second heat and came home in 1 :16. Mr. Miller beat this time in his second heat, finishing his sixth round in 1 :15¼. Mr. Gosling made his third heat in 1 :16½, and Mr. Miller accomplished his third heat in 1 :16, and was declared winner of the race, and the prize, a handsome silver goblet, worth $100, given by Mr. William Wilson McGrew.

"The second race was one of a third of a mile, the fastest rider to receive a silver wine-service, the contribution of Henry R. Smith & Co.

"Mr. Gosling was the first in the field. He made the third of a mile in 1 :29 2-5. Mr. Miller followed, and made the distance in 1 :16 3-5. Master Curtis, a vigorous little velocipedist, made a valorous struggle for the prize, but his brisk little pony was not equal to the task. He made the six rounds in 1 :35. Mr. McKinney followed, but lost by a fall. He gave way to Mr. H. L. Perry, who lost by touching the floor with his foot in the second round. At this juncture St. Clair, the skater, plunged in with an impetuous steed, which made directly for a post, and threw him to the floor, thus being the means of losing the race for Mr. St. Clair. Mr. Wm. H. Davis put his animal on the track, but unfortunately gave him so much rein that he broke badly in the third round and lost the race. This ended the race, and Mr. Miller was declared the winner.

"The third prize, a silver goblet, contributed by Duhme & Co., was the person who could ride the velocipede at the slowest gait. This slow riding on the velocipede is a delicate task, and good requires judgment and a deal of fine management on the part of the man who attempts it. Mr. Gosling prolonged his three circles around the hall to 3 :15 3-5, and the spectators thought him very slow. But Mr. Miller, his only rival, was much slower, and crept around the hall like a tortoise, finishing the feat in 5 :10. By this achievement he won the third prize, and the plaudits of the whole assembly. The sport wound up with an exhibition of the skill of all the velocipedists present. All the races were interesting, and those for the fastest time were very exciting indeed, rousing the spectators, and drawing from them cheer after cheer as the particular favorites gained advantages."

One of the Troy, N. Y., dailies having asked the question, "Who is the young man destined to be the first to introduce the velocipede in Troy?" has received the following answer from a correspondent:

"You ask in your Thursday's issue, 'Who is the young man destined to be the first to introduce the velocipede in Troy?' That young man has long since 'gone to that bourne from whence no traveler returns.' The velocipede is no new thing in Troy—it may be new to the present generation, but it long since rattled over the streets of our city at a rate of speed that would make the famous 'Dexter' sweat, or a second class locomotive puff and blow like a Third avenue clam horse. Forty-six years ago, or thereabouts, a then young man (and one of the best that ever lived in this city, too), by the name of Silas Davis, who resided on the south-west corner of Liberty and First streets, exactly opposite to where the holy temple of St John now stands, and who was an apprentice to one of the best machinists that ever lived in or carried on the business in Troy, by the name of John Rogers (father of our fellow-townsman Alexander Rogers), and whose business was then located on the south-west corner of Division and First streets, which shop is now a dwelling, and was lately occupied by Justice Neary; and he, in connection with said John Rogers, constructed three of these wonderful vehicles called velocipedes, and introduced them upon the streets of Troy, for the use and benefit of all who were disposed to pay the then considerable sum of twenty-five cents an hour for their use. The first one, if I remember correctly, was brought out for exhibition and trial on a magnificent moonlight night in the month of June. No public announcement heralded its coming. It appeared, nevertheless, in front of the hotel of the late William Pierce, located on River street between Congress and Ferry streets, between 8 and 9 o'clock in the evening, and although the mansions of our city in those days were as far apart, on the average, as village lamp posts, and our population could hardly be counted for the paucity of its numbers compared to what it can be now, a respectable crowd soon gathered, and a disposition to try the untamed and wonderfully curious steed was soon manifested by many of the young men who had there gathered. The first man to mount and give an exhibition of its operation was Davis himself. He handled it with perfect ease and drove it with tremendous velocity from Congress street to Washington street and back. All were astonished and delighted. The velocipede was declared to be one of the world's greatest wonders—bound to supersede horse flesh for traveling purposes. Livery men began to look blue and almost made up their minds that their occupation was in danger of simmering down to such small ends that they might as well abandon the business at once, and substitute, on dry and pleasant weather at least, velocipedes for saddle horses. The next person to mount the prodigy was Benjamin Bayeux. He was the fortunate possessor of a 'quarter,' and could use the thing for an hour. After one or two capsizes he got under full headway, and made excellent work of it, driving the machine at a 2:40 gait down River to Division, up Division to Third, up Third to River, up River to Mount Olympus, and back to the hotel, in an incredible short space of time, when he surrendered it to Moses V. Yevnett, who was equally successful in its operation, and the velocipede was pronounced a success. They were used after that about the embryo city for a year or two by the young bloods of the town, and then finally disappeared, to re-appear again at the expiration of almost a half century, to make a sensation and excite the greater admiration and astonishment of their beholders." This velocipede was probably one of the old style propelled by contact of the feet with the ground.

Captain Du Buisson, Commander of Prince Napoleon's yacht, the *Jérome Napoleon*, has an invention whereby he proposes to run a velocipede upon the water with almost the same facility that Burnham and Hanlon run theirs upon the land. It is composed of two parallel tubes of cast iron, cigar-shaped, connected by iron cross-pieces. In the center is a propelling wheel, covered by a house or drum, on the top of which the person using the vessel sits comfortably in a sort of saddle, with stirrups. By means of these stirrups and a hand crank upon each side, he gives the wheel its motion, precisely as it is given to a velocipede on shore. The novel craft is easily propelled at the rate of six miles an hour.

A correspondent of an English paper announces that he has invented, and will shortly exhibit, a one-wheeled velocipede, and says that it is safer and in every way superior to the two-wheeled machine. A steam velocipede has also been invented in England, an engraving of which, with description, will be shortly given to our readers.

A gentleman residing in Twenty-second street, in this city, comes down to his business in Church street, on a velocipede, every morning, in twelve minutes.

A lady residing in Brooklyn, writes to us that, for her part, she objects to the double side-saddle plan, suggested by our fair correspondent from Georgia, noticed last week. She sees no objection to ladies donning a proper dress and using the velocipede pure and simple. She argues that the exercise would be much more thorough and healthful, than it could be on any such mongrel machine as the one suggested by our Georgia correspondent, while one of the principal charms of velocipede sport, its delightful independence, would be entirely lost in such a machine. She is willing to grant that the company of an agreeable gentleman would go far to reconcile her to the disadvantages of such a machine, but if two ladies were to be paired thus she thinks it would be simply intolerable. One thing is certain, the ladies can not be left out in the consideration of this subject by manufacturers.

Speaking of manufacturers, we understand that establishments devoted to velocipede making, have their hands more than full to meet the present demand.

The "Kenosha" Steam Frigate.

We have received the following account of a splendid ship just finished at the Brooklyn yard, built under the supervision of B. F. Delano, constructor at this station: "The U. S. S. *Kenosha*, built at the navy yard, Brooklyn, N. Y., is of the same class as the *Alaska*, built at Boston, the *Algoma*, at Portsmouth, N. H., and the *Omaha*, building at Philadelphia. They are all from one design by John Lenthall, Chief of Bureau of Construction and Repair. The machinery was designed by B. F. Isherwood, Chief of Bureau, Steam Engineering.

"The first frame of this ship was raised on the 27th of June, 1867, and she was launched on the 8th of August, 1868. Her principal dimensions are: Length, extreme, 268 feet 9 inches; length on load line, 250 feet 6 inches; extreme breadth, 38 feet; depth of hold, 19 feet 7 inches; tunnage (new), 1119·68 tuns. She has two decks beside the poop and forecastle, with 6 feet head room in clear of beams. The ward room is arranged with ten comfortable state-rooms, five on each side, and a good sized "country" between. In the after end is a large ward room pantry and two store rooms. Forward of the ward room is the steerage, which contains three good state-rooms, beside a room for assistant engineers, 12 feet long, and the midshipmen's room, 18 feet long. The necessary store and mess rooms are forward of the steerage. Below decks are the magazines, shell rooms, store rooms, etc., forward and abaft the machinery. The rig of the vessel is barque. The armament is one 11-inch pivot, six 8-inch guns on iron carriages, one 60-pounder on forecastle deck, and two 24-pounders on poop, beside two 12-pounder boat howitzers.

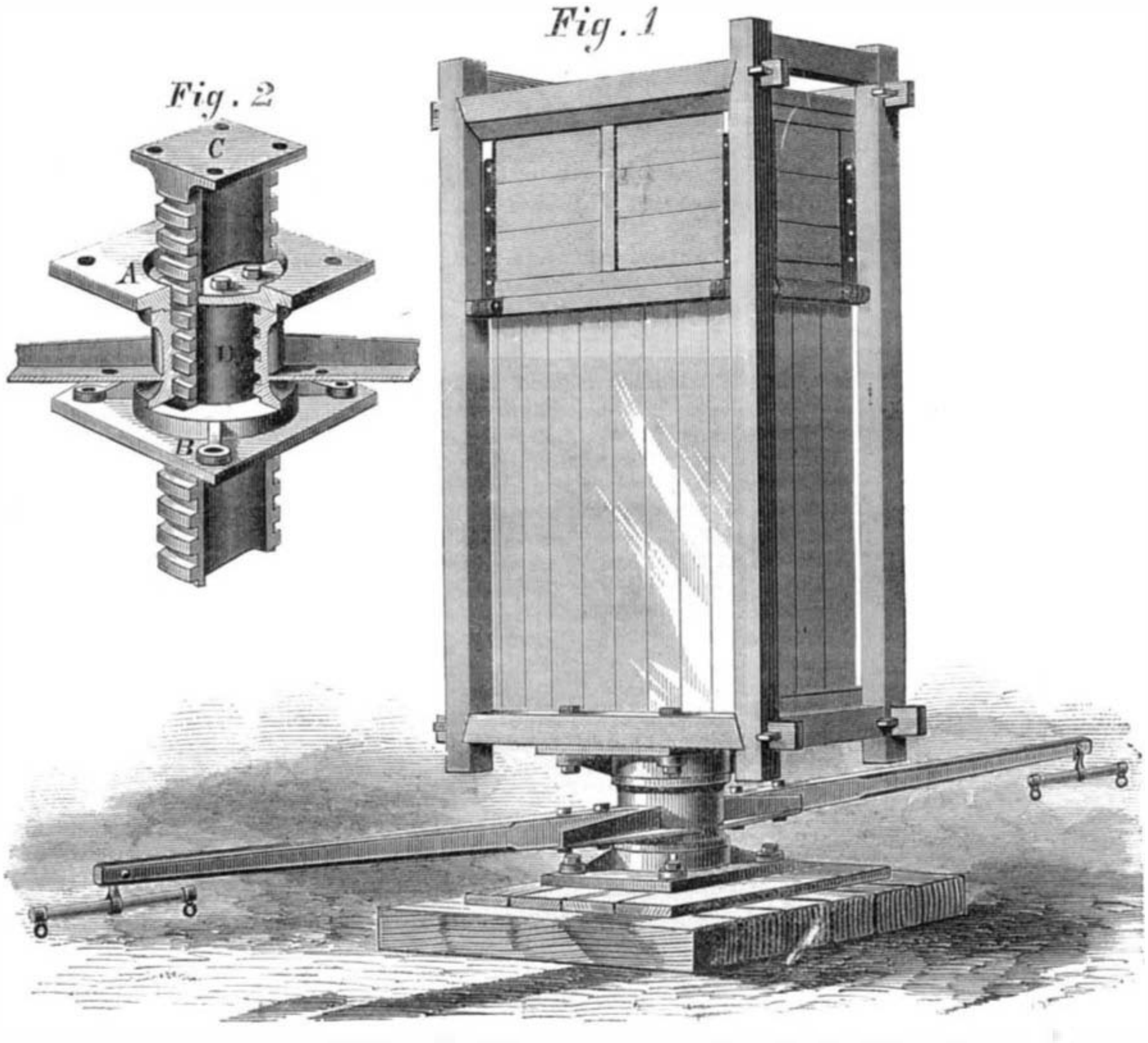
Her engines are double piston rod, back acting, having two cylinders, 50 inches diameter by 42-inch stroke, Sewell's condenser; 4 main boilers, 5 furnaces in each, superheater in uptake; grate surface 290 square feet; total heating surface 7,260 square feet; two smoke pipes 64 feet above grates, 72 inches diameter; two bladed, hoisting screw, 16 feet 4 inches diameter.

The ship will soon be in commission, the work on her being nearly completed. The machinery was all built at the Brooklyn navy yard, except the screw shaft which was forged at the Washington yard.

Improvement in Cotton and Hay Presses.

The simplest device for pressing and baling cotton is the screw, usually of wood, and is employed on three-fourths of the Southern plantations. It has generally a diameter of from sixteen to twenty inches, with a pitch of thread of from six to nine inches, and is operated by two long levers extending from the top of the screw at an angle until they nearly reach the ground, to the ends of which horses or mules are attached for working it. Various attempts have been made to supersede these presses, which are rude and cumbersome, work with great loss of power from friction, and, as they cannot be housed, wear out more from exposure to the weather than from actual use; and a great many presses have been invented, none of which has realized the anticipations of their inventors. They worked too slow, were too weak to give the enormous pressure required to bale cotton, could not be repaired, if broken, by means at hand on the plantation, or, perhaps, more than from any other reason, were too expensive. The wood screw has these advantages, which overcome in a measure its many disadvantages: It can be built entirely from material to be found on the plantation, requires but little iron work, works with great power, and is not complicated with levers, ropes, pulleys, and windlasses. Owing to its coarse pitch but few turns are required to run it up and down, a very important matter when it is considered that the horses move in a path from thirty to forty feet in diameter. Of late years the cast-iron screws have found favor, as the planter has only to purchase the iron work, and the wood work is done, as heretofore, on the plantation; and many forms of adapting these screws to their work have been devised, some of them having great merit.

The objections to the common cast-iron screws are these: They cannot be made of a diameter large enough to receive the coarse pitch of thread that is required to save the travel of the horse, and bale the cotton rapidly; and being of cast iron and small diameter are liable to be twisted off, as the screw presents the greatest length when the strain is the heaviest. The design of the screw here shown is to be obviate as far as possible the objections against both the wood and iron screws.



ALBERTSON'S PATENT SCREW PRESS FOR BULKY MATERIALS.

The receiver is a box, or pentstock, in the usual form, having at its upper part hinged sides or doors for removing the bale. A follower traverses the lower portion, being connected with the elevating screw. The whole is supported on a pedestal composed of two plates of any required size and form, one bolted to the receiver and the lower one to a suitable platform. They are represented in Fig. 2 by A for the upper plate and B for the lower. The follower is bolted to the end, C, of the screw. The screw is a double or triple segment of threads—in the engraving double—recessed below the depth of the thread on either side. Segments of a cylinder, D, forming portions of the plates, A and B, and hollow, admit bolts through to secure the two plates together. Between these plates turns a nut, outside the segments of the cylinder, which represent the size of the screw, the nut being furnished with sockets for the reception of levers to the outer ends of which the power—animal—is attached. It will be seen that the pedestal is the entire support of the superstructure, and the power being applied directly, near the ground, and the screw traversing through a fixed column, no unnecessary torsion or twisting of the fabric occurs.

The screw, however, may be secured to the top of the press, or, in other words, the press be inverted, if desired, although the friction and consequent power required will be greater. It will be seen that the screw cannot receive any twist, being firmly held by the pedestal at the point where the power of the nut is received by the screw, and the only strain that the screw receives is in the direction of its length. By relieving the screw from twist, the following important advantages are secured: The screw can be made very light in comparison to the weight that would be required for a cylinder receiving the twist, and any desired pitch, however coarse, can be used. There is no friction of the follower on the sides of the press box. The nut is supported by, and revolves entirely on the body of the pedestal. The iron work can be made and shipped to the plantation, and the wood work of the press made there as heretofore.

This press was patented December 15th, 1868, by James M. Albertson, of New London, Conn., to whom all letters for information regarding the manufacture and sale should be addressed.

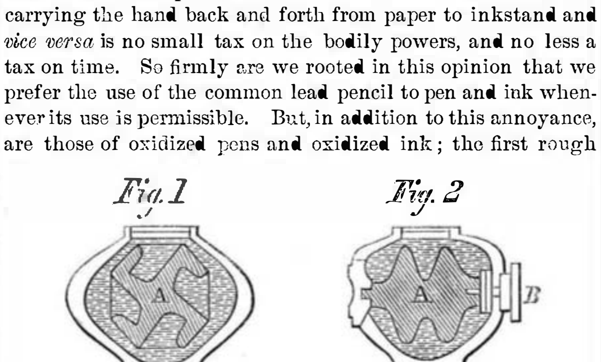
NEARLY two millions of false teeth are annually turned out of a single manufactory in Philadelphia.

The Philosophy of Tea-Making.

The results of the investigations of careful experimenters are hardly, perhaps, sufficiently known to the multitude of tea-drinkers. The whole subject is carefully summarized by Dr. Letheby in his recent lectures. There is a popular notion, which is an incorrect one, that soft water is best for tea-making. As a matter of fact, water which has about five degrees of hardness when boiled, makes the best flavored tea, provided that it be allowed to stand upon the tea sufficiently long. Boiling tea is one of the follies of which the officials in workhouses and other large establishments are guilty. This makes a deep-colored solution, containing the worthless bitter extractive matter, which is devoid of physiological or dietetic property. In point of strength, it is found experimentally that infusions of tea and coffee are strong enough when about two and a half teaspoonfuls of tea, or two ounces of freshly roasted coffee, are infused in boiling water.

THE STOLTZ ROTARY INKSTAND.

Years ago we suggested as a worthy object of scientific research and mechanical ingenuity the discovery and production of something to supersede the slow, dirty, annoying, and laborious device of pen and ink. The mere muscular effort of carrying the hand back and forth from paper to inkstand and *vice versa* is no small tax on the bodily powers, and no less a tax on time. So firmly are we rooted in this opinion that we prefer the use of the common lead pencil to pen and ink whenever its use is permissible. But, in addition to this annoyance, are those of oxidized pens and oxidized ink; the first rough



and unyielding, and the other thick and muddy. A pen that will not shed the ink, and ink that blurs, blots, leaves a *bas relief* of dirt on the paper, or sticks to the pen like molasses are not calculated to soothe the ruffled feathers of the hurried or worried pen driver.

We copy from the London *Mechanic's Magazine* two views of a rotary inkstand, which, it is claimed, prevents the introduction of foreign bodies, allows the contents to be shaken without spilling, and permits the quantity presented for use to be varied according to demand, while at all times the ink is preserved from contact with the air and consequent oxidation. Fig. 1 is a cross section and Fig. 2 a vertical section of the inkstand. A disk, A, containing four cups, rotates in the body of the inkstand, being turned by a button, B, projecting on the outside. Turning the button to the right fills one of the cups and brings its top or mouth to the aperture in the stand. Turning it to the left empties the ink contained in the cups and leaves the solid part of the disk under the aperture, closing the orifice. Thus the ink need never stand long enough exposed to the air to become fouled with dust or to become oxidized. Packings of rubber are interposed between the axis of the rotating disk and the side of the stand to make a hermetical joint and secure sufficient friction to keep the disk in place. These are important advantages and if they can be secured by so simple a device as the one illustrated are certainly worthy attention. We have never yet used an inkstand that fulfilled all the requirements necessary to a proper enjoyment of the delights of writing or the demands of business. If this is not perfect we are certain that its suggestions will not be lost on our inventors.

Acarus Sacchari, The Sugar Insect.

The following is a synopsis of Robert Niccol's research as to the *acarus sacchari*: Every variety of unrefined sugar contains more or less acari, minute insects, resembling somewhat the sea crab. These are well known in sugar warerooms; and no one who sees them running nimbly along the tables would ever use raw sugar. Many believe it more economical, and sweetens better, and really a teaspoonful does go farther than the white article, but it is because it is heavier, but if an equal weight of the refined was used, it would be far better. It not only impairs the flavor of the tea and coffee, but also is injurious to the health; the dry, large-grained, and light-colored is the most nutritious and economical. In a pound of sugar there are no less than 100,000 of these insects. Dr. Hassel says that out of seventy-two samples, he observed sixty-nine in a living state. By dissolving a spoonful of raw sugar in a glass of water, these may be seen on the surface as white specks. In refined sugar they do not occur, because they cannot pass through the charcoal filters of the refinery, and because it does not contain any nitrogenous substance, as albumen, for even the most insignificant animal cannot exist if entirely deprived of nitrogen. When the refined article is left too long in iron cisterns, after its solution in water has been effected, a trace of the metal may become dissolved, in which the sugar is impure, this rarely however occurs. Grocers and sugar-warehouse men are subject to a kind of "itch," affecting their hands and wrists only, and as they are usually of cleanly habits, the disease can only be accounted for in this way, that the *acarus sacchari*, like its congener, the *acarus scabiei*, has burrowing propensities, bores into their skin, and breeds there. These two resemble each other closely, though the sugar insect is larger and more formidable. Pure sugar is almost as desirable as pure water, and who would, who has any pretension to cleanliness, drink stagnant water if he could as easily obtain it pure, and who would eat raw sugar, teeming with animalcules and vegetable impurities, if the refined article were as easily purchased?

UTILIZATION OF THE REFUSE LIME OF THE GAS WORKS FOR THE MANUFACTURE OF SAL AMMONIAC AND PRUSSIAN BLUE.—The lime used in the gas works for the purification of the gas becomes charged chiefly with two products of the destructive distillation of coal—results of the combination of its nascent nitrogen, viz., ammonia NH_3 and cyanogen NC_2. When steam is passed over such lime the ammonia escapes and may be passed through sulphuric acid, when sulphate of ammonia is obtained. By treating this with common salt (chloride of sodium) is easily decomposed into sulphate of soda and chloride of ammonium or sal ammoniac. The remaining lime, freed from the ammonia, contains the soluble ferro-cyanide of calcium; this is extracted by solution in water, and after filtration the clear solution is mixed with a solution of sulphate of iron, when the ferro-cyanide of iron or Prussian blue is precipitated. This is collected, washed, and dried.

DR. DETHEIR, of Constantinople, gives a description of the great bronze cannon used by Mahomet in the siege of Constantinople. Its weight was 80,596 lbs.; length, thirty feet; caliber, 46 inches; and the charge of powder required was 200 lbs. The balls used were stones, weighing 1,200 lbs. The American Rodman gun weighs 116,497 lbs.; has a length of 25 feet; caliber, 20 inches, and carries a ball of 1,000 lbs., with a charge of 100 lbs. of powder.

A SYSTEM of metallic ceilings, which consists in the application to the joisling of very thin stamped metal in ornamental embossed panels, has lately been invented. These stamped panels are fitted for every kind of decoration in color, and if inserted as plain surfaces may be used as the ground for every description of cartoon painting, combining with lightness and durability, artistic and ornamental effect.