It includes two departments. One is the home for aged ship and marine engine builders. To this are admitted destitute ship carpenters and their wives, under the restriction that they shall have been of that trade. It has been calculated that over seventy trades may be represented in the construction of a ship; the Webb Home is for wielders of the broadax only and for the engine builders. These inmates of the home are termed the guests. At present all the guests have been in the employ in times past of Mr. Webb or of his father.

The other department is the Academy of Ship Building. This is for boys whose parents are unable to continue their education in ship building. The candidates must be between 17 and 20 years of age and must pass a satisfactory examination, the mathematical part being particularly insisted on. The academy furnishes to such boys a free and gratuitous education in ship building and marine engine building, with board, lodging and necessary implements and materials.

The institution is incorporated under an act of incorporation passed by the New York State Legislature and approved by the Governor April 2, 1889.

The building is one hundred and eighty feet long and eighty feet deep. It faces to the east, its rear windows overlooking the Harlem River. Its lower tower is surmounted by a flagstaff bearing as weather vane a model of the armored ship of war Dunderberg, commenced by Mr. Webb for the United States navy during the war, and subsequently sold by him to the French government. A piazza, with columns of brownstone and arched bays, runs along the east and south sides and around the southern tower, forming a characteristic feature, with a real ship's deck for flooring. Brownstone and cream-colored brick are the materials of construction of the main building.

In general appliances, it may be termed a first class hotel. It has, in the domestic department, a kitchen with the best cooking apparatus, extensive ice boxes and cold storage rooms, a steam laundry, with steam washers, porcelain wash tubs, centrifugal and hot chamber driers and steam mangle, a butler's pantry with steam tables, and several dining rooms. The main dining room is for the guests and boys; the others are for the different classes of help.

The dormitories occupy several floors. Each is a double or single bedded room, with stained wood furniture, iron bedstead, single or double, with art rug on the floor, and in all respects equal to the accommodations of a hotel. The guest's and boys' rooms are practically identical in their furnishing.

Two power elevators and a complete electric lighting plant are part of the equipment. Both gas and electric lighting are supplied throughout.

In the second story hall hangs Mr. Webb's portrait in full length, by G. Gerhard, which we reproduce.

The school rooms occupy part of the north tower. The boys' preferences so far have been for ship building proper. Many of the rooms are fitted up with drawing tables and improved drawing boards. The marine engine building course will, undoubtedly, soon be a feature. Prof. Constantine Janssen is in charge of the course at present, and instructors will be added as required.

One of the characteristic features is the moulding loft, occupying the extreme upper story of the main building. Here the students will have practice in laying out the lines of ships of the full size, reproducing their work from model and draught exactly as in regular ship-yard practice.

The museum contains a number of models of ships built by Mr. Webb and some most interesting pictures of old time ships and steamboats. A beautiful reproduction of the Dunderberg occupies one table. Elsewhere is a wooden ship builder's model of a hull saved from the ruins of his father's yard after a fire. The model is badly scorched but is still an interesting example of the lines of the old time American sailing craft. Here, too, is an interesting piece of furniture, a solid mahogany table from the Khedive of Egypt. It was part of the equipment of the Dessoug, the ship which brought over the obelisk to New York from Egypt.

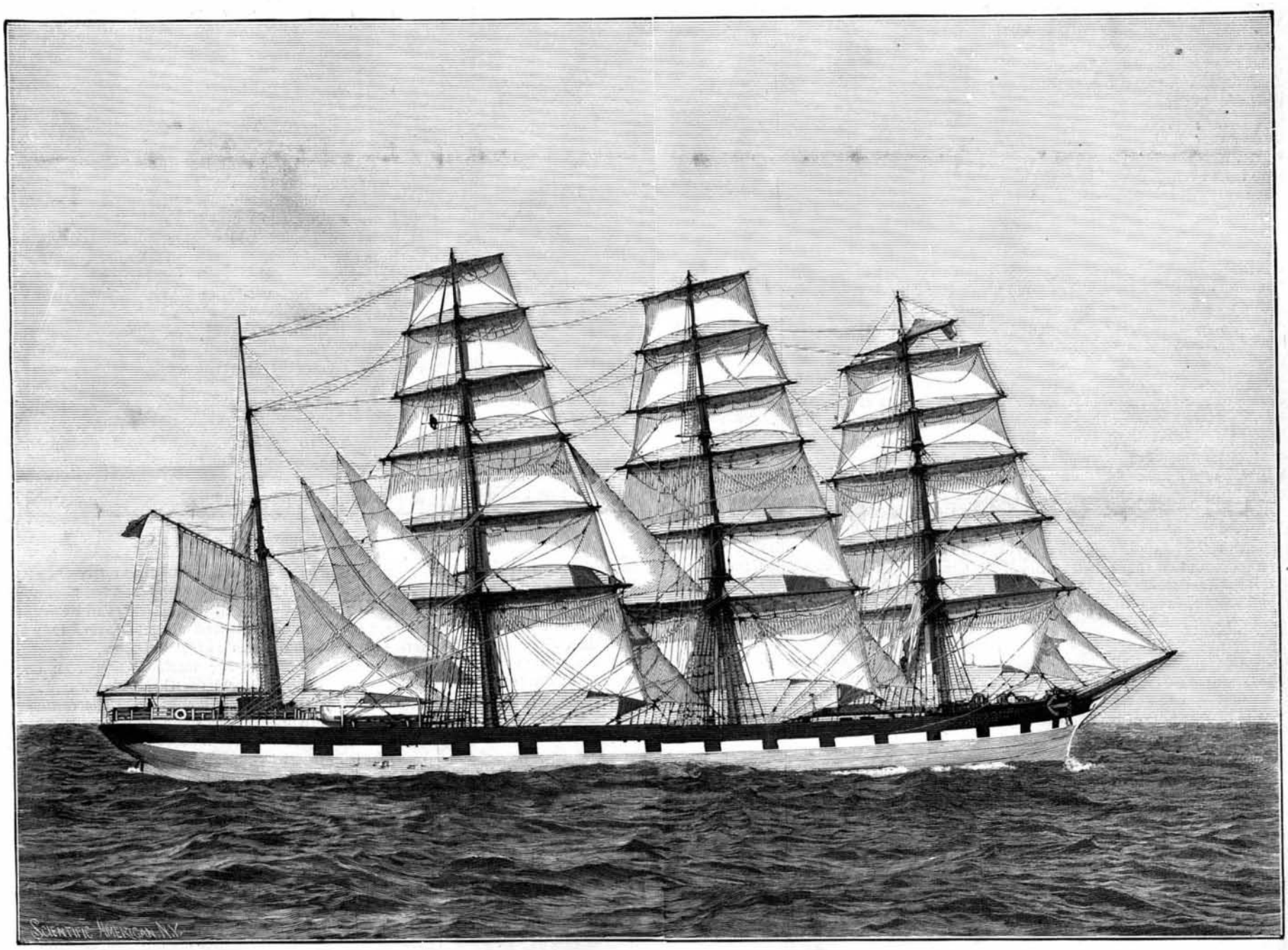
The library, with its cases, table, and miscellaneous books, is one of the most pleasing rooms, and far up in the north tower is another recreation room, the gymnasium. It is questionable if a more lovely view can be had in the city than that from the windows of this apartment. The Hudson River, the government works at Spuyten Duyvil Creek, and Long Island Sound, can all be seen from it.

The institution is in charge of Mr. Andrew Reed, the resident and managing director, and Mrs. Alice Howard Hilton, the well known authoress, as superintendent, to whom our thanks are specially due for attentions conferred. The architect of the building was Mr. Arthur P. Jennings, of this city.

THE FOUR-MASTED SHIP AFGHANISTAN.

It is not an easy matter to obtain a photograph of a large ship under full sail. It is only upon the broad ocean that her full canvas is ordinarily brought into play. It was at the beginning of a voyage from the outer harbor of Boston that our artist correspondent, Mr. H. L. Stebbins, happily succeeded in camerizing the four-masted ship Afghanistan, and from his photograph our engraving has been made.

The Afghanistan is a British ship, built in 1888, of iron, at Stockton on Tees, by Richardson, Duck & Co. Her gross register is 2,286 tons. Length, 291 feet 2 inches. Beam, 42 feet 1 inch. Depth of hold, 24 feet 3 inches. She is provided with steam hoisting apparatus and all the modern improvements. At present the ship is in Chinese waters.



THE FOUR-MASTED SHIP AFGHANISTAN.

American Trade in Ecuador.

United States Consul Dillard, of Guayaquil, says: The advisable course to pursue in order to foster a trade with these countries (Guayaquil being the commercial metropolis for a vast extent of territory) would be to send hither competent men who speak Spanish to study the necessities of the trade and report to their employers. One man at first might represent several branches of trade. The government can never build up a trade with these countries. Our countrymen formerly had an instinct for foreign trade; they must cultivate it anew.

There is a great field here for our simplest agricultural implements—plows, hoes, etc. The machete is the agricultural implement used here. If a live man were sent here with plows, hoes, and other simple implements of agriculture, prepared to go on the haciendas and show the people how to use them, and the immense gain in using them, I do not think the result would be doubtful.

I have never seen corn meal in Ecuador; it is unknown, at least in the vicinity of Guayaquil, and yet large quantities of corn are produced. Corn mills might be introduced, with little expense, into the corn producing regions, such as that of the rich lands on the Boliche River, where I ate several meals at a great hacienda where there was not seen a crumb of bread, except what our party carried along. Yet on this place were hundreds of bushels of very fine corn. *Yuca* is used instead of bread. It is a great root, somewhat like the sweet potato of our Southern States.

Progress of Preventive Medicine.*

BY JAMES F. HIBBERD, LL.D., M.D., RICHMOND, IND.

Ten years ago the only known means of preventing the invasion of any country or city by cholera was to exclude every person and thing contaminated by the germs of the disorder. In 1884 cholera was epidemic and severe in Egypt, and was soon transported to Southern Europe. Germany, England, France, and Italy each appointed a commission of practical medical men and expert bacteriologists to inquire into the nature of the malady and devise means of prophylaxis. No better illustration of the rapid progress of preventive medicine and the manner of that progress can be desired than a study of the methods of investigation pursued by those commissioners and the formulated results of their labors. Their investigations began in Egypt, continued in Europe, and were complete in India, where cholera has its continuous renewal and perpetual home. The results of their labors were not entirely harmonious at first, but the unequaled Koch, at the head of the German commission, made a detailed report of the work and established the facts, the accuracy of which has been conceded by all parties.

Accordingly, we now know that the cholera germ is the spirillum choleræ Asiaticæ—commonly called the comma bacillus of Koch—that it is found in the human body only in the intestines of its victims, where it multiplies rapidly; that it is not communicated directly from person to person, but the alvine evacuations of the victims find their way, generally through water, into the bowels of susceptible persons, who then become additional victims; that this germ also finds a breeding place in damp soil and in stagnant pools and in running streams containing organic matter, and survives in pure water, but does not multiply there; that it is virile only within narrow thermal limits; that it holds its life by a frailer tenure than any other equally prolific and destructive pathogenic spirillum, being quickly destroyed by the official germicides, by drying, by acids, and by a temperature below 56° or above 126° F.

It is the application of this exact knowledge that has confined the cholera to the quarantine dominions at New York, thus preventing its diffusion in the United States; and it is a like application of this knowledge that has, on sundry occasions and at divers points in England and on the Continent, enabled the authorities to confine the Asiatic plague to the single case in which it was discovered. And, per contra, it is ignorance of these established facts, or failure to use them, that permits the ravages of cholera at this time in Arabia, in Russia, and on the shores of the Mediterranean.

Every practitioner of medicine in this country should feel it an obligation to constitute himself a propagandist of the knowledge of the means of prevention of cholera among the populace, and when the people are thoroughly informed in this behalf and join intelligently and heartily with the health authorities in recognizing and managing the first case that may appear in any locality, the disease will be stamped out at that point, and then cholera can never again become epidemic in the United States.

YELLOW FEVER.

Yellow fever is another scourge that has been and still is being much studied, and not with such satisfactory results touching the nature of its course as with cholera, but enough has been determined in regard to its nature to warrant the declaration that it can be stamped out at any point where it may appear. All that is necessary to protect us from further invasion of yellow fever is the watchfulness, the intelligence, the skill, and the devotion to duty everywhere that has been so successfully exercised for eight years by the health authorities at New Orleans.

It is known that yellow fever is an exotic in the United States, and that it comes to us almost exclusively from the inter-tropical islands and mainland on the eastern border of the Western Hemisphere, and it is a reasonable anticipation that the diligent expert investigation now actively prosecuted will presently yield us such knowledge of the nature of its germ and its nativity as will enable us to strangle it in the place of its birth. The pregnant idea of dealing with germ diseases, that have a localized origin, at the point of their generation was under consideration by the Pan-American Medical Congress at its first session in Washington in September, and it is just such great organizations as that, composed of men with enlightened minds and courageous natures, that will work out the problems of sanitary science and art for the welfare of the world.—*Jour. Amer. Med. Assn.*

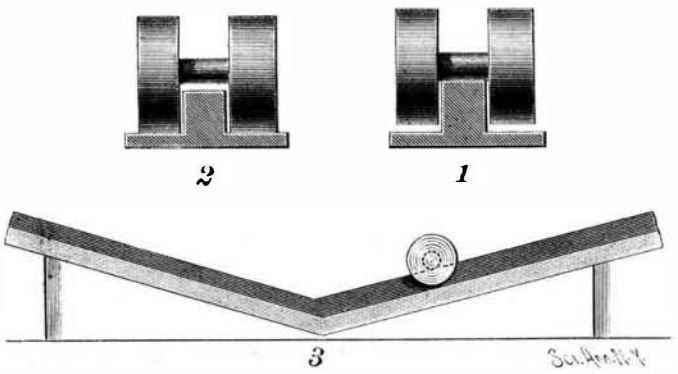
THE American Teredo Proof Company has erected works at Gig Harbor, Puget Sound, where piling for wharf and dock building is treated with a patent preparation, after which, it is claimed, they will withstand all attacks by the destroying teredo.

*Abstract of Address on General Medicine, at a meeting of the Mississippi Valley Medical Association, October 12, 1893.

INTERESTING EXPERIMENTS.

BY PROF. F. J. HILLIG.

I. Experiment with Turpentine Film on Water.—Cover the surface of water in a tank of about two feet diameter with lycopodium. Put in the middle of the part covered a drop of turpentine. A very striking action ensues. The turpentine sweeps in a moment the lycopodium from the center away toward the circumference of a large circle, which it clears perfectly of any trace of the powder. Besides illustrating the behavior of the film toward the lycopodium, the experiment shows the velocity with which such a film spreads over the surface of water, and finally may serve to give an approximate value of the thickness of the film. Taking *v. g.* 15 cub. mm. of turpentine, the surface of the circle covered by the film will be found to measure about 30 cm. in diameter. Applying



EXPERIMENT IN GRAVITY.

the formula of the cylinder's volume: $V = r^2 \pi h$, the value of $r = 150$ mm., we have:

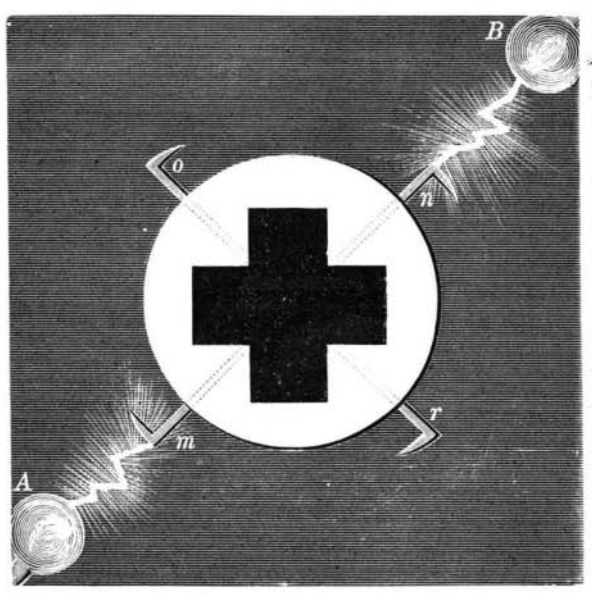
$$15 = 150^2 \pi h, \text{ therefore}$$

$$\text{thickness} = h = \frac{15}{150^2 \pi} = \frac{1}{4712} \text{ mm.}$$

II. Experiment in Gravity.—Fit together three cylindrical pieces of wood, as shown in Figs. 1 and 2, to make a double wheel. Then procure two rails about two feet long, with a projecting part in the middle, as in cross section, Figs. 1 and 2. The projection of Fig. 1 will be noticed to be longer than that of Fig. 2, and the distance from the axle to the rims of the wheels to be less than projection in Fig. 1 and more than that in Fig. 2. Now put the two rails with their ends close together, supporting the opposite ends, to produce slight inclination. So the apparatus is ready for use. Set the wheel on upper end of rail No. 1. Since the projection is greater than the corresponding groove of the wheel, the latter will roll down on its inner cylinder, producing a very slow run, but a certain momentum will be developed which, as soon as the wheel strikes rail No. 2, will change the rate of velocity to a much higher degree, because on the second rail the wheel runs on its outer cylinders. Thus you have a wheel running faster up hill than down.

As will be understood, the projection of rail No. 2 is used only to deceive the eye.

III. An Optical Illusion.—Between the electrodes of a Holtz-Toeppler machine place an electrical whirl



AN OPTICAL ILLUSION.

at the same level with the electrodes. To the whirl you fasten a circular piece of stiff white paper with some regular figure on it in black. The pivot on which the whirl is to rotate should be insulated. After a few seconds of running your machine, sparks will pass over every time when the wire, *m n* or *o p*, takes the direction of A B. This experiment performed in the dark will show the cross always in the same position, thus giving the whirl the appearance of being at rest, though it moves rapidly.

Sugar Beet Items—Germany.

Most excellent results have recently been obtained in beet cultivation by planting and subsequently plowing under a green crop, such as peas. It is found by accurate calculation that nitrogen may be thus furnished to the soil at lower cost than is possible either by the use of barn-yard manure or through chemical salts, such as sodic-nitrate, etc. About 20 tons of beets, averaging 13 per cent sugar to the acre, have been obtained by this special method of cultivation.

A mode of working beet sirups for second and third grade sugars has been giving some success. Immediately after the sirups leave the pan, while still hot, air is forced through them. After twenty-four hours there forms a voluminous frothy mass, which has a specific gravity less than water. If this is allowed to remain in the crystallizing tanks, nearly all the sugar of the sirup will crystallize. The separation of this sugar offers no special novelty; it is interesting to note, however, that the sugar obtained by this process averages a very low percentage of ash. The tanks used for mixing the air with sirups are made very much after the plan of those used in saturation of beet juices with carbonic acid. The air may be either forced through or drawn through; the time required depends upon the quality of the product worked.

Recent experiments show that electricity has one effect upon beet juices that is not to be overlooked. The sugar percentage increases, but this is followed by a slight decolorization. About 50 per cent less time in such cases is needed for defecation than by ordinary methods of carbonatation. When zinc is used as an electrode, the metal is dissolved; one portion of it becomes a neutral double salt and the other portion a zincate, which gives an alkaline reaction to the juice.

When platinum is used as an electrode, inverted sugar is formed; this is never to be dreaded with zinc. Other experiments upon diffusion juices, with an electric current from a Siemens dynamo giving 35 to 40 amperes with 4 to 5 volts between the zinc electrodes, resulted in a deposition on the positive pole of a thick, fatty substance. This should be withdrawn before the juices are defecated with lime. The electric current coagulates the albumen to a certain extent. While certain explanations may be offered as to the reactions, etc., that take place, none are sufficiently accurate to be generally accepted.

The sugar manufacturers have declined to accept the proposal of the sugar refiners respecting raw sugars of 88°. Special arrangements have been made as regards sugars testing 92°. The latter are almost free from organic substances. It has been recommended that considerably more of the 88° sugar be made than hitherto; under such circumstances the manufacturers may be better able to make terms with the refiners.

The problem of handling waste waters from beet sugar factories is by no means settled. The water residuum, most to be dreaded, comes from the diffusion battery and pulp presses. In some special cases, where there is a scarcity of water, this waste water must be used over again. Notwithstanding the precaution of purification, such as employed, after a reasonable time the salts, etc., not eliminated give considerable trouble during manufacture.

The experiments made in crystallization in motion appear to continue in favor among manufacturers, most of whom are willing to admit that by this plan more sugar may be extracted from second and third grade sirups than by any other existing method.

Some most interesting experiments have been made to determine the loss of sugar during evaporation of alkaline juices. After 90 minutes a solution containing 250 grammes sugar, 20 c.c. potassic solution, 230 grammes water, heated to 125° C., polarized 49·11, corresponding to a loss of 0·74 in the polarization. All experiments appear to point to the fact that alkalinity resulting from existing methods of working has but little influence on sugar destruction; what changes do occur may be mainly attributed to heating.

Exportation of beet sugar from Hamburg has remained almost stationary during the past four years. During 1892–93 it was 653,722 tons, of which England received 242,515 tons refined sugar.

Slices of cork have been giving most excellent results in filter presses; these obviate many of the difficulties contended with in filtering very dense sirups. The expense is about $10 per 10,000 tons beets. The cork offers an excellent medium for several days without being renewed; in fact, even then it may be washed in the presses, which operation demands about one-half hour. The cork may remain in the presses for a month, provided it receives its regular washing at intervals of one week. The filling and emptying cork requires less time than the renewing of filtering cloths. Any bone filter may be changed into a cork filter.—*The Sugar Beet.*

THE first coast light in the United States was erected in 1678.