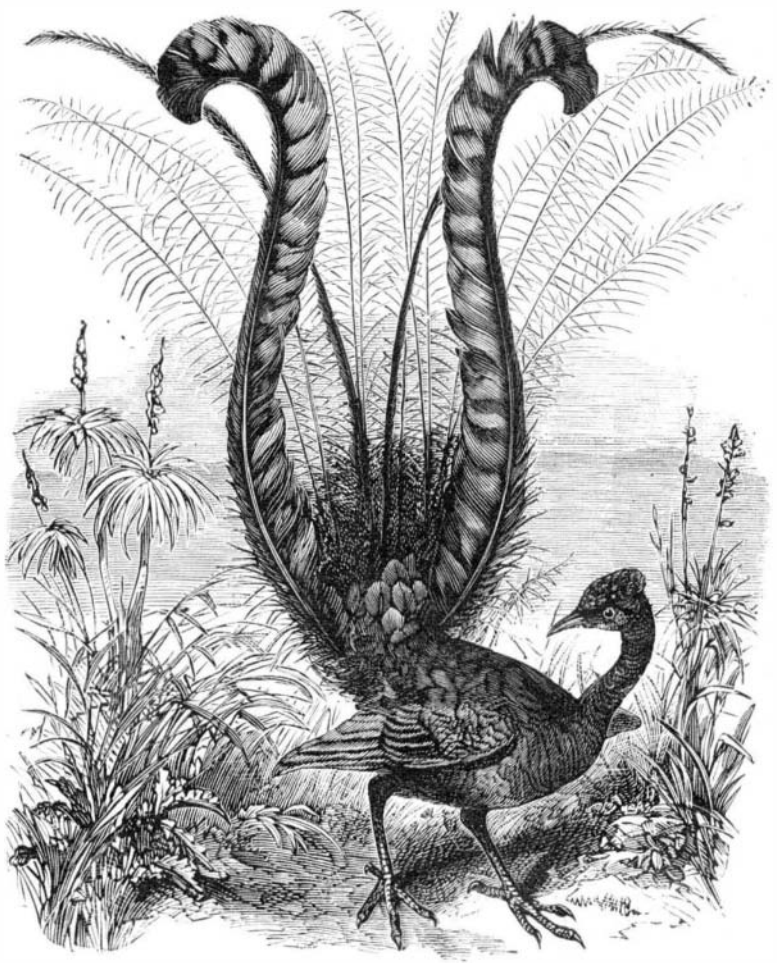
THE LYRE BIRD.

This bird, if it had been known to the ancients, would have been consecrated to Apollo, its lyre-shaped tail and flexible voice giving it a double claim to such honors. The extraordinary tail of this bird is often upward of ten feet in length, and consists of sixteen feathers, formed and arranged in a very curious and graceful manner. The two outer feathers are broadly webbed, and are curved in a manner that gives to the widely spread tail the appearance of an ancient lyre. When the tail is merely held erect, and not spread, the two lyre-shaped feathers cross each other, and produce an entirely different outline. The two central tail feathers are narrowly webbed, and all of the others are modified with long slender shafts, bearded by alternate feathery filaments, and well representing the strings of the lyre.

The tail is seen at its greatest beauty between the months of June and September, after which time it is shed, to make its first reappearance in the ensuing February or March. The great stronghold of the lyre bird is the colony of New South Wales. It is of a wandering disposition, and although it probably keeps to the same bush, it is constantly engaged in traversing it from one end to the other, from the mountain base to the top of the gullies, whose steep and rugged sides present no obstacle to its long legs and powerful muscular thighs. It is stated that it will spring ten feet perpendicularly from the ground. The food of the lyre bird consists principally of insects, particularly of centipedes and cleoptera.

We take our illustration from Wood's "Natural History."



THE LYRE BIRD.

Photographic Maps.

The advantages of the process of sun engraving upon copper, as practiced by the Austrian Military Geographical Institute, are dwelt upon in *Petermann's Mittheilungen.* The maps of the new Austrian ordnance map are carefully drawn on paper, on a scale of 1 to 60,000. They are then reduced photographically to a scale of 1 to 75,000, transferred upon copper, touched up, and printed. In this manner each sheet of the map can b produced in nine months, while the same amount of work, engraved in the usual manner, requires nearly 46 months for its completion. The whole of the Austrian staff map, consisting of 715 sheets, will thus be completed in 10 or 12 years. No less than 271 have been published since 1874. The advantages of this process, as regards cost and rapidity of publication, are evident, and they fully compensate for any slight inferiority in the appearance of the work.

NEW BRIDGE OVER THE DOURO RIVER, PORTUGAL.

The viaduct projected by the Royal Company of Portuguese Railroads, and designed to traverse the Douro River, near Oporto, Portugal, is nearly 1,129 feet in length between the faces of the abutments. The roadway is 200 feet above the plane of general comparison, said plane being 38 feet below the level at low water. A central arch crosses the stream and is connected at the upper portion to the sides of the ravine by two lateral viaducts. The depth of the river and the thickness of the clay banks, which it was necessary to traverse in order to plant piles securely, rendered the adoption of the single arch, 512 feet in span, and supported on the rocks on each side, advisable. On the summit of this arch the roadway rests, while it is also supported by metal trestles which conform in height to the irregularities of the soil.

Owing to the dimensions of the arch its construction involves some peculiar features. It was, in the first place, necessary to avoid the use of rigid tympanums, in which case the calculations, already very uncertain, became still more complicated owing to the dilatation, the effects of which would profoundly disarrange the equilibrium of the various parts. It would also be necessary to use an immense quantity of metal in order to insure the safety of the structure. Tympanums were therefore completely suppressed, the arch being given sufficient rigidity to resist the strains tending to deformation resulting from unequal distribution of the stress. The arch was therefore given considerable vertical thickness, this being 32 feet at the key. At the abutments it was essential that the arch should rest on two supports, as is ordinarily the case on large openings. It thus became necessary that the vertical height should decrease toward the extremities, the extrados and intrados converging on the support. To this end the form adopted is that of an arch of neutral fibers almost parabolic, but the highest of which diminishes from key to abutments. This form is that of a demi-lune—the intrados and extrados being besides interconnected by a system of vertical and oblique pieces forming St. Andrew's crosses, so as to insure the complete solidity of the whole.

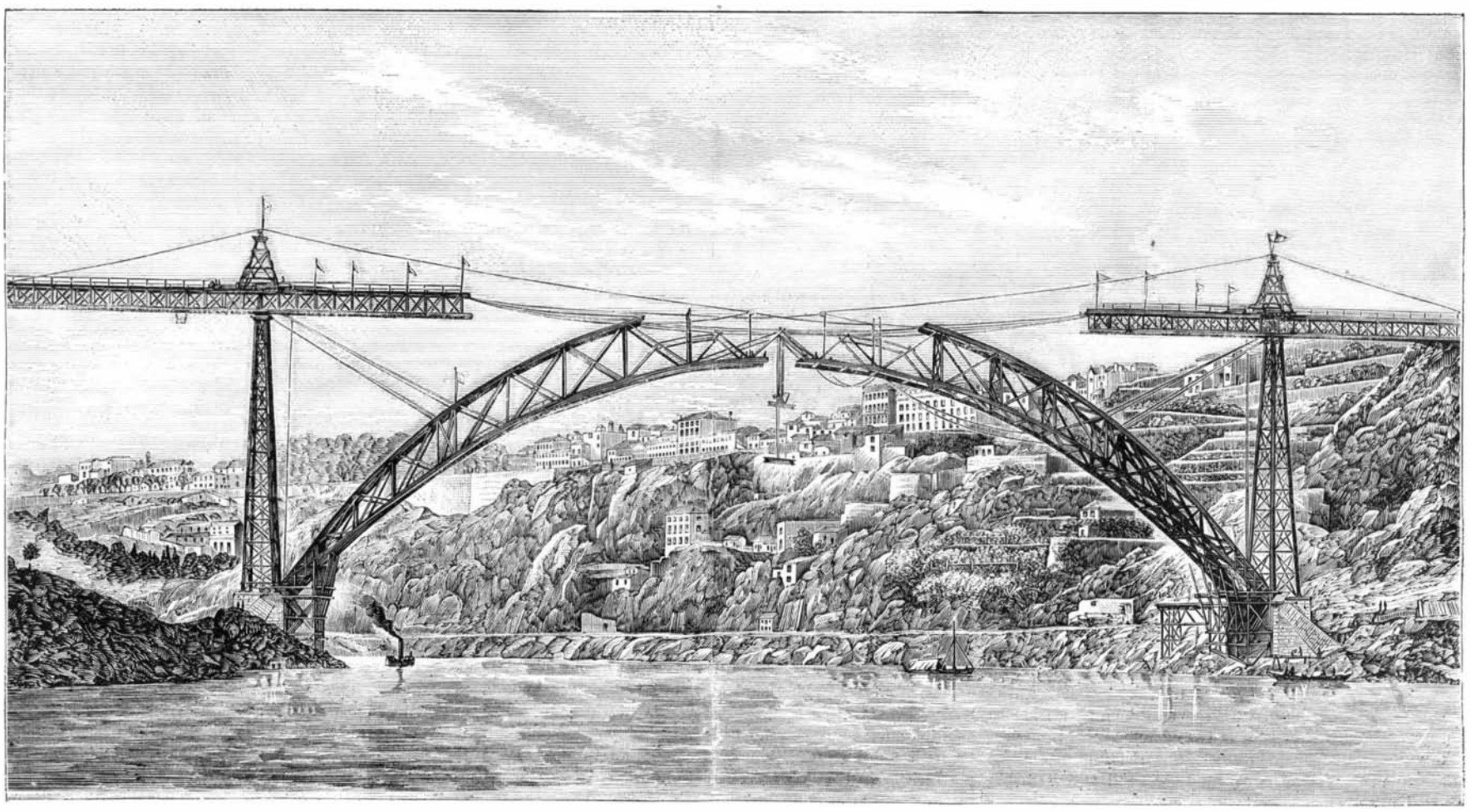
A new condition also presented itself due to the resistance offered by the structure to the wind. In order that the violence of tempests might be resisted, it was indispensable that the arch should be broad or at least possess a wide base, as it was obviously useless to make the upper portion wider than the 12·8 foot roadway. The width of the base supports was therefore fixed at 48 feet—as it was necessary to form the central arch as a crescent situated in oblique planes with relation to the vertical, distant 12·6 feet at the upper portion and 48 feet at the base. The arches are connected by a system of vertical frames, placed transversely, formed by horizontal traverses and vertical rising timbers fixed on the arches and the St. Andrew's crosses. Besides, in the planes of the intrados and extrados are strengthening pieces which consolidate the connection between the two arches.

The roadway reposes on each side on a metallic pillar fixed on the spandrel of the arch, and is prolonged to the abutments resting on the Lisbon side, on a trestle which has its base on the arch abutment, and then on two similar trestles of less height. On the Oporto side there is but one intermediate pillar. The roadway is so attached to the arch that the latter is free to move without disturbing it. The pillars are entirely of laminated iron—cast iron being rejected as not offering sufficient security. We take our illustration from *Engineering.*

American Institute Exhibition.

Our manufacturers are now fully awake in the matter of exhibitions, and so far as their limited space is concerned we are assured the coming exhibition of the American Institute of this city will be of more than usual value and novelty. For information address the General Superintendent, New York city.

CONSUMPTIVE PERCH.—Seth Green has lately been examining the perch and sunfish that have died in great numbers in Lake George. He finds that the disease is a fungous growth on the gills, resembling pulmonary consumption; and warns the people against eating the fish.



THE NEW BRIDGE OVER THE DOURO RIVER, PORTUGAL.

New Agricultural Inventions.

Emanuel Cook, of Oglethorpe, Ga., is the inventor of an improved Condensing Attachment to cotton gins, by which the cotton is delivered in smooth and uniform state, and clear of all dust, sand, and trash, the latter being conducted to the outside of the ginhouse, so as to prevent it from settling on the cotton and machine.

Joseph Laude, of Monticello, Ark., has patented an improved Seed Planter for planting cotton, corn, peas, and other seeds, which plants the seeds regularly and uniformly, and may be adjusted to plant more or less corn and peas to a hill. It will plant the seed to the end of the row, and will not catch upon stumps or other obstructions.

Alexander G. McIntosh, of Atalissa, Iowa, is the inventor of an improved Binding Harvester, which cuts the grain, gathers it into gavels, and binds it, the various operating parts receiving motion from the drive wheel of the machine.

An improved Gate has been patented by Stephen W. Moore, of Mount Etna, Ind. This invention relates to the construction of the pivot of the lever that operates the gate, the construction of the hinge of the gate, and the device for locking the gate in any vertical adjustment.

Daniel Hays, of Martinsville, Mo., is the inventor of an improved Corn Planter and Plow, whereby the plowing of the ground, cutting of weeds to prevent choking of the plows, and the dropping and covering of the seed are all performed at one operation

Stephen McColm, of Waggoner's Ripple, Ohio, has patented an improved Soil Pulverizer, for breaking in pieces the lumps and clods of soil, to better adapt it for cultivation. It is so constructed as to bring the weight of the machine in contact with the surface of the soil on about one-third of the surface covered by the machine. It will readily clear itself of clods that may be forced into its interior.

An improved Grain Drier has been patented by Richard H. Tiernan, of Galveston, Texas. The invention consists of a sheet metal box having a series of inclined and laterally oscillating sieves, in connection with fixed shelves below the sieves, and with a top supply hopper and a bottom discharge opening for the grain. The box or casing is provided near the bottom with an entrance opening for the blast of hot air, that is forced in opposite direction to the motion of the grain through the apparatus and to the outside by a top opening near the supply hopper.

Alfred N. Myers, of Augusta, Ky., has invented an improved Churn, which is so constructed that by oscillating a lever the dasher arms will be moved rapidly through the milk, first in one direction and then in the other, throwing the milk into violent agitation, and bringing the butter in a very short time.

Isaac Turman, of Smithland, Iowa, has patented an improved Grain Separator for cleaning oats and other grain of the various impurities, such as chaff, dust, dirt, etc., for using it as a better feed for horses in training, or for seeding or other purposes.

The True Idea of Teaching.

Commenting on the failure of Sir John Lubbock's motion to add an elementary knowledge of common things to the subjects of instruction for which grants are given under the English Education Code, the London *Times* remarks that "a large amount of costly and pretentious teaching fails dismally for no other reason than because it is not directed by any knowledge of the mode of action of the organ to which the teacher endeavors to appeal; and mental growth in many instances occurs in spite of teaching rather than on account of it. Education, which might once have been defined as an endeavor to expand the intellect by the introduction of mechanically compressed facts, should now be defined as an endeavor favorably to influence a vital process; and, when so regarded, its direction should manifestly fall somewhat into the hands of those by whom the nature of vital processes has been most completely studied. In other words, it becomes neither more nor less than a branch of applied physiology; and physiologists tell us with regard to it that the common processes of teaching are open to the grave objection that they constantly appeal to the lower centers of nervous function, which govern the memory of and the reaction upon sensations, rather than to those higher ones which are the organs of ratiocination and of volition. Hence a great deal which passes for education is really a degradation of the human brain to efforts below its natural capacities. This applies especially to book work, in which the memory of sounds in given sequences is often the sole demand of the teacher, and in which the pupil, instead of knowing the meaning of the sounds, often does not know what 'meaning' means. As soon as the sequence of the sounds is forgotten, nothing remains. . . . The efforts of a wise teacher should always be guided with reference to the position and surroundings of a child at home, and should seek to supplement the deficiencies of home training and example. Among the wealthier classes the floating information of the family circle often, though by no means always, both excites and gratifies a curiosity about natural phenomena; but among the poor this stimulus to mental growth is almost, if not entirely, wanting. An explanation of the physical causes of common events, such, for instance, as the rising of water in a pump, would usually be a revelation to the pupils of a Board School, and would start them upon a track which could hardly fail to render them more skillful workers in any department of industry, and which might even lead some of them to fortune. A wise and benevolent squire set on foot many years ago a school for the children of his laborers, in which drawing and the elements of natural science were carefully taught; and the result was that the children educated there, instead of remaining at the plow's tail, passed, in an astonishingly large number of cases, into positions of responsibility and profit."

"Antrum."

"What is the antrum, and why and how is it subject to disease?" *Antrum* means a "cavern." In anatomy it applies to certain cavities in bones, the entrance to which is smaller than the interior. "*Antrum Highmorionum*" (so named from being discovered by Dr. Highmore) "is a deep cavity in the substance of the superior maxillary bone (the upper jaw) communicating with the middle meatus of the nose." It is lined by a prolongation of the mucous membrane which lines the cavities communicating with the nose. This "cavern" is situated from one eighth to three eighths of an inch above the extreme point of the fang of the second bicuspid and first molar teeth, the intervening bone being quite cellular.

Disease of the antrum may occur from an injury to the cheek bone, or either of the teeth above named; possibly from some chronic affection of the nose. More frequently, however, it originates from one of these teeth becoming decayed and diseased at the root. When the peridontium (lining membrane of the tooth's socket) or the pulp of the tooth becomes ulcerated, and the pus is prevented from discharging through the pulp canal of the root, it will necessarily find vent in some direction; usually through the alveolar process and gum—forming an alveolar abscess ("gum boil"). Not infrequently, however, the inflammation and consequent pus find a more ready passage through the cellular tissue of the maxillary to the antrum. If confined to these parts any length of time necrosis (dead bone) follows, and sooner or later produces tumor or cancer. In the earlier stages of diseased antrum, especially when originating from a tooth, the treatment and cure is simple and comparatively painless. It is only necessary to have an opening to the cavity through the alveolus and maxillary, either by extracting the diseased tooth or by an artificial aperture. This passage must be kept open by means of tents until the disease is entirely eradicated and new and healthy tissue takes its place. The treatment consists in injecting the cavity with a mild antiseptic, thoroughly washing out all accumulation of decomposed substance, once or oftener every day, until healthy granulation is completely established.

Just here it is important to repeat, and urge upon the community, parents especially, the fact that the first molars of the permanent teeth come in when the child is six years of age. Also that they are the most important in preserving the contour of the mouth and in masticating the food. They are almost certain to begin to decay when the child is from eight to twelve years of age, and if not promptly filled are certain to give great pain and trouble. They should never be extracted while there is any possibility of saving them by suitable treatment and filling. Parties who have suffered have urged me to elucidate this subject, as a warning to intelligent people not to procrastinate the important matter of preserving the teeth. Nothing but prompt, constant, and scientific attention will save them. Procrastination invariably increases expense and depreciates the teeth, health, and beauty.—*A. H. Trego, D.D.S., in Western Review.*

A New Cheap and Self-generating Disinfectant.

Under this title Dr. John Day, of Geelong, Australia, recommends for use in civil and military hospitals, and also for the purpose of destroying the poison germs of infectious diseases, a disinfectant composed of one part of rectified oil of turpentine and seven parts of benzine, with the addition of five drops of oil of verbena to each ounce.

Its purifying and disinfecting properties are due to the power presumed to be possessed by each of its ingredients of absorbing atmospheric oxygen and converting it into either peroxide of hydrogen or ozone. Articles of clothing, furniture, wall paper, carpeting, books, newspapers, letters, etc., may be perfectly saturated with it without receiving the slightest injury; and when it has once been freely used on any rough or porous surface, its action will be persistent for an almost indefinite period. This may at any time be readily shown by pouring a few drops of a solution of iodide of potassium over the material which has been disinfected, when the peroxide of hydrogen, which is being continually generated within it, will quickly liberate the iodine from its combination with the potassium, and give rise to dark brown stains. It may be applied with a brush or sponge, or if more convenient, as is the case with certain articles, such as books, newspapers, and letters, it may be simply poured over them until they are well soaked; they may then be allowed to dry, either in a warm room or in the open air. It is hardly necessary to say that this disinfectant should never be made use of in the neighborhood of fire or artificial lights for fear of accidents from ignition of the vapors arising both from the benzine and turpentine.

Gilding on Glass.

A new process by M. Dodon is thus given by the *Moniteur de la Céramique:* Gold, chemically pure, is dissolved in aqua regia (1 part nitric and 3 parts hydrochloric acid). The solution effected, the excess of acids is evaporated on a water bath till crystallization of the chloride of gold takes place; it is then taken off and diluted with distilled water of such quantity as to make a solution containing 1 gramme of gold to 200 cubic centimeters of liquid; a solution of caustic soda is then added until the liquid exhibits an alkaline reaction. The solution of gold is now ready for reduction. As a reducing agent an alcoholic solution of common illuminating gas is used. This is prepared by simply attaching a rubber tube to a gas jet and passing the current of gas for about an hour through a quart of alcohol. This liquid (which should be kept in a closed vessel) is added in quantities of from two to three cubic centimeters to 200 cubic centimeters of the alkaline solution of gold before mentioned; the liquid soon begins to turn to a dark green color, and at length produces the metallic layer of gold of known reflecting power.

As an improvement on the process, as well as for convenience in executing it, there may be added to the alcoholic solution of gas an equal quantity of glycerin (28° to 30° Baumé) previously diluted with its own volume of distilled water.

If the gold employed is an alloy, the foreign metals must in all cases be first removed; and especially the least traces of silver, because the very smallest quantity of this metal totally prevents the regular and uniform deposition of the gold.

The bath thus once prepared, it is proposed as a method of gilding mirrors, but also for all the articles of various branches of industry where this process of gilding could be used with success and to advantage, such, for instance, as boxes, necklace beads, candlesticks, glass ornaments, frames of table mirrors, cups, saucers, spoons, lanterns, and reflectors, and for objects generally in glass or crystal that are capable of being completely gilded.

ICES AND ICE CREAMS.

What are termed ices consist simply of the juices of fruits sweetened with sugar sirup and then frozen, like ice cream. It is stated that the best ices are made by first cooking the sugar into the form of a sirup, having a strength of 30°. The fruit juices are strained through a sieve and then added, with a little water and the whites of a few eggs, to the prepared sirup. The final mixture should have a consistence of 22°. It is then frozen in the usual way.

To make the best ice cream it is necessary that the cream should be of the best quality; and the utensils in which it is made must be absolutely clean.

With every quart of the cream mix six ounces best pulverized white sugar, a very little vanilla bean, and the white of one egg. The latter imparts a smoothness and delicacy to the cream that cannot otherwise be obtained. The prepared mixture is then to be stirred in the freezer until it is entirely congealed.

Those who desire first rate ices or cream should follow these directions carefully, and avoid the use of corn starch or other thickeners. Instead of vanilla as a flavor for the cream, a trifling amount of any desired flavoring sirup or juice may be used, as strawberry, pineapple, orange, lemon, etc.

Density of Population and Health.

At a general conference of British architects, a few weeks ago, the general building regulations of the United Kingdom were discussed at length. Among the points brought out were these: 1. That the experience of what are called model lodging houses, such as the Peabody buildings in London and other large towns, combined with that of barracks, workhouses, and schools, furnishes abundant evidence that what is termed density of population is not so detrimental physically as has been hastily assumed; because in such buildings as are referred to the rate of mortality is much less, with a density of 1,500 persons to the acre, than it is in ordinary small houses, with a density of only 250 to the acre. 2. That the health of a community is much more dependent upon food, clothing, and personal habits than upon the arrangement and construction of dwellings or workshops; for however perfect may be the arrangement and construction, they may be entirely neutralized if the food is bad, the clothing deficient, and the personal habits filthy.

The unsanitary conditions of densely populated districts in this city seem to be chiefly due to the fact that the houses of the inhabitants were not originally intended for those who have come to live in them. With dwellings properly constructed for multiple tenancy, properly policed, two or three times as many people to the acre could be healthfully accommodated.

Improvement in Electro-Magnets.

M. Ernest Bisson, in a recent session of the Academy of Sciences, at Paris, announced that he had invented a new method of rolling the wire on the bobbins of electro-magnets. His method (which he has patented) is thus described: At the end of every row he carries the wire back in a straight line to its point of departure, in order to recommence the rolling from the same side as in the preceding rows. He states that he has thus obtained very remarkable results. With the same core of soft iron, the same pile, and the same quantity of the same wire wound in the old way or according to the new method, he finds an advantage of a third (that is, half more) in favor of his invention. His first experiments were made on bobbins of small size; but he has repeated them upon a core of iron about 22 inches long, covered with 35 lbs. of wire measuring over 2,000 feet, and has ascertained that the magnetism obtained opposed a resistance represented by 3 when the wire is wound in the way he describes, and by 2 when it is wound in the old way. Whatever be the cause of the phenomenon, there is no doubt about the fact, which is easy to ascertain.