addition to this source of economy, the demand for the deutoxyd of manganese for chemical purposes in glass-making, bleaching, and other processes in the arts, presents a means by which the residuum may be disposed of at a price which will leave the cost of the gas merely nominal. Thousands of tuns are imported annually into this country, from the continent, for the before-named purposes, and hence the disposal of the residuum is a matter of certainty.

The chlorate of potassa is a substance which, though costly at first hand, is nevertheless a valuable material for the production of oxygen gas, from the facility which it affords to the operator. The comparatively low temperature needed for its disengagement and the rapidity with which it is produced require less attention and labor. Hence the cost of the gas is not so great as would at first sight appear, when contrasted with that from manganese. The residuum is chloride of potassium, or familiarly, muriate of potash, and is used in the arts.

The cost of the lime will, under proper arrangements, be extremely small; the cost per hour for each jet may be taken at ·03 of a penny.

Having thus shown the modes of obtaining the elements of the light, it now only remains to describe the improved form of the instrument in which they are utilized, with some of the many important applications which are contemplated by the Lime Light Company. A patent was taken out in this country, in 1858, for "Improvements in apparatus employed in the production of light," by Mr. J. H. Bastable (a communication); and subsequently a patent for additional improvements was obtained (in 1859) by Mr. Prosser. The object of these patents is to remedy the defects of the former applications of the lime light. It has been invariably found that, although for short periods, for microscopes, and similar comparatively minor applications of the light, the adopted methods of applying the lime were, with great care, sufficient for the purpose, yet for the general purpose of lighting, the means were totally inadequate to the object; as the lime, when exposed to the action of the heat produced by the combustion of the gases or the influence of the atmosphere, unavoidably became cracked or decrepitated, and in this ruptured state, having no support, fell away from the jet of flame, and either rendered the light inconstant or entirely useless; for the ignited gases, without the presence of the lime, possess no illuminating power whatsoever, though they are in that state most powerful agents for the destructive separation of refractory substances.

To effect the desired object of protecting the lime from crumbling away and of insuring a practically unlimited supply, the simple expedient of enclosing the lime in a case or guard, both above and below the point of ignition, was resorted to, exposing only such a portion of its surface as was required for the action of the gases; and by giving to the lime so enclosed a movement within the tube, the retention of the ruptured portions of the lime was insured, until, by simple means, they were allowed to escape without detriment to the light, or were replaced by a fresh supply in as simple a manner as the cotton wick of an argand lamp, thus effecting, with the perfect continuity of the light for any reasonable period (a fortnight or more if necessary) of time, the maximum brilliancy of the light.

So simple are the mechanical appliances for producing these results, that they fall as much within the compass of the ordinary attention bestowed on such objects as that required for an ordinary lamp.

The extreme purity of the light eminently adapts it for interior illumination, as there is no evolution of deleterious gases or fumes (which from gas, are so destructive to works of art, as pictures, furniture and costly embellishments); nor any abstraction of the oxygen from the atmosphere, the requisite quantity for combustion being supplied by the instrument itself.

The light can be used either as a naked light, or in combination with the catoptric, dioptric, or the catadioptric systems, for lighthouses and ships of every class; for railroad stations and signals, both fixed and movable; for floating-light vessels or buoys in navigable channels; for bridges, wharfs, public buildings, factories, squares, and large and important thoroughfares; and by a judicious and compact arrangement of apparatus, its introduction into the interior of mansions where gas has not hitherto found access will doubtless be insured. The application to street lighting, from its extensive and important character, has been reserved for the serious consideration of the company, who have, however, so far matured their plans as to justify their anticipations of complete success.

BORACIC ACID IN THE PACIFIC.

In San Francisco there is an Academy of Natural Sciences, which has some very able and prominent members. At one of its recent meetings, a paper was read on the above subject by Dr. John A. Veatch, in which he stated that the fact of boracic acid being in the sea water along their coast was brought to his attention in 1857. Prior to that period he had discovered the borate of soda in the water of a mineral spring at the upper end of the Sacramento Valley, and he had found borates in nearly all the mineral springs of California. Borate of soda was so abundant in one particular locality that enormous crystals of that salt were formed at the bottom of a shallow lake, or rather marsh, one or two hundred acres in extent. The crystals were hexehedral with beveled or replaced edges, and truncated angles; attaining the size, in some cases, of four inches in length by two in diameter, forming splendid and attractive specimens. In the same neighborhood, a cluster of small thermal springs were observed holding free boracic acid in solution. A few hundred yards from these a great number of hot springs of a temperature of 212° F., rose up through the fissures of a silicious rock. These springs held a considerable quantity of borax, as well as free boracic acid. Many other localities furnished similar indications, but in a less extensive form.

"In progress of examination," says Dr. Veatch, "I found that the common salt (chloride of sodium) exposed for sale at the San Francisco market; and which, it was understood, came from certain deposits of that article on the sea margin in the southern part of the State, also furnished boracic acid. I was led to attribute it to the fact of mineral springs emptying into the lagoons furnishing the salt. It was, therefore, a matter of no small surprise, when on a visit to the localities, I found no trace of acid in any of the springs in the adjacent district. This led to an examination of the sea water, and a detection of an appreciable quantity of boracic acid therein. It was at Santa Barbara where I first detected it, and subsequently at various points, from San Diego to the Straits of Fuca. It seems to be in the form of borate of soda, and perhaps of lime. The quantity diminishes toward the North. It is barely perceptible in specimens of water brought from beyond Oregon, and seems to reach its maximum near San Diego. This peculiarity seems to extend no great distance seaward. Water taken thirty or forty miles west from San Francisco gave no trace of acid. In twelve specimens taken at various points between this port and the Sandwich Islands, furnished me by Mr. Gulich, of Honolulu, only that noarest our coast gave boracic acid. In ten specimens furnished me by Dr. W. O. Ayres, taken up by Dr. J. D. B. Stillman, in a trip of one of the Pacific mail steamers from Panama to this place, no acid was observed south of the Cortez Shoals."

AMERICAN MACHINERY FOR THE AMOOR RIVER.

We saw, last Monday, at pier No. 11 North river, in this city, one of J. C. Hoadley's portable steam engines on its way to Mantchooria. Mr. Hoadley received a letter from the Novelty Works in this city, on Saturday, Feb. 18th, ordering the engine on condition that it could be in this city on Tuesday, March 6th. As it would require to be finished on Thursday, March 1st, at his shop in Lawrence, Mass., this gave Mr. H. less than two weeks to do the work. He however accepted the order at once, and immediately took his horse and visited his workmen, to have them on hand early on Monday morning; and as a carriage for this particular engine required some peculiarly heavy seasoned plank, he telegraphed in various directions to learn where this might be procured. The man who made the axles was induced to run his shop on the holiday of Feb. 22d, and by this energy the engine was landed in this city one day before the specified time, all finished in the most thorough and substantial manner, with everything necessary to its operation in the wilderness to which it is to be transported, more than 15,000 miles away.

We understand that this engine is intended to drive one of Parkhurst's saw mills, and is to fill part of a large order for machinery which the Novelty Works had received from a Russian now in this city, who intends to take it to the Amoor, in the north east corner of Asia, where he expects to sell it to the Russian government.

It is the same style of engine as the one mentioned by us in the notices of the fair of the American Institute last Fall. Mr. Hoadley tells us that that notice, occupying perhaps two inches in one of our columns, brought him more than 50 letters. Considering that the prices of his engines range from $300 to $2,300 and that consequently these 50 letters relate to the purchase of some $50,000 worth of property, this affords a striking proof of the influence of our paper.

CURING SMOKY CHIMNEYS

MESSRS. EDITORS:—I wish to notice an answer which you gave to C. Q. L., of Mo., on page 110 of the present volume of the SCIENTIFIC AMERICAN, where you say "the higher the chimney, the better the draft." That theory will not always hold good in practice. In fact, I have noticed some chimneys that smoked worse, if possible, by being built higher. My theory is: the higher the chimney—if properly built, and of the right size—the better the draft. As an illustration of the above, I will state a fact that occurred a few years ago, while I was engaged in chimney-building. A gentleman came to me, and said he had two chimneys (on the two wings of his house) that smoked very badly. They were 11 feet high above the roof; and on one of them he had tried a stove-pipe 10 feet long, with a cap on top to turn with the wind, yet it smoked worse than before. He now wished them "laid over," or fixed so as to prevent smoking, but would not have the job done unless warranted to cure. I undertook the job. The size of the chimneys was 20 by 32 inches on the inside. I took them down only to the roof, and commenced laying them up, drawing in gradually till the size was reduced to 4 by 12 inches on the inside; then carried them up straight to within 18 inches of the top; then laid out again, in laying on three courses of brick, to increase the size to 8 by 16 inches on the inside; then drew in on three courses, back to the size of 4 by 12 inches, and laid another course perpendicular to the last; the whole hight being only five feet above the roof. Neither of those chimneys has ever smoked since that time—a period of eleven years.

Munnsville, N. Y., Feb. 25, 1860. L. L. G.

[The question of "curing smoky chimneys," and the *draft* of chimneys are not the same exactly in a scientific point of view. A chimney may smoke—that is, may have a deficient draft, owing to the situation of the house on which it is placed; and by increasing its hight, the evil may only be aggravated, as our correspondent has justly observed. We have known several cases of this kind. The houses were situated where whirls of wind forced the smoke down the chimneys. The latter must be constructed according to circumstances, and the practical information which our correspondent has furnished is very valuable; still it is true as a principle that "the higher the chimney, the better the draft," and it is upon this theory that all the tall chimneys for factories are constructed.—EDS.

TENEMENT HOUSES—A GOOD IDEA.

MESSRS. EDITORS:—I beg leave to suggest a simple, sure, durable, cheap and easy fire-escape for tenement houses. Such houses are generally from 20 to 30 feet higher than the adjoining houses. Let an iron ladder be permanently annexed to the side wall of the tenement house, thus connecting the roof of the tenement house with the roof of the adjoining house. In case of fire, the inmates occupying rooms below the origin of the fire, may escape by decending the common stairs, those occupying rooms above the origin of the fire may escape by ascending the common stairs to the roof, and making use of the iron ladder to reach the roof of the adjoining house. Thus all will be saved. Such an iron ladder would cost from ten to twenty dollars, according to the length. No landlord would (at the request of one respectable tenant) refuse to furnish it. No tenant of a tenement house should neglect to demand it. But I trust that this communication will arrest the attention of some member of the legislature, who, appreciating the effectual and wholly unobjectionable character of this improvement, will procure the enactment of a law requiring its adoption for all tenement houses.

J. A. D.